RECENT ADVANCES IN TREATMENT

THE PRACTITIONER

FOUNDED IN THE YEAR 1868

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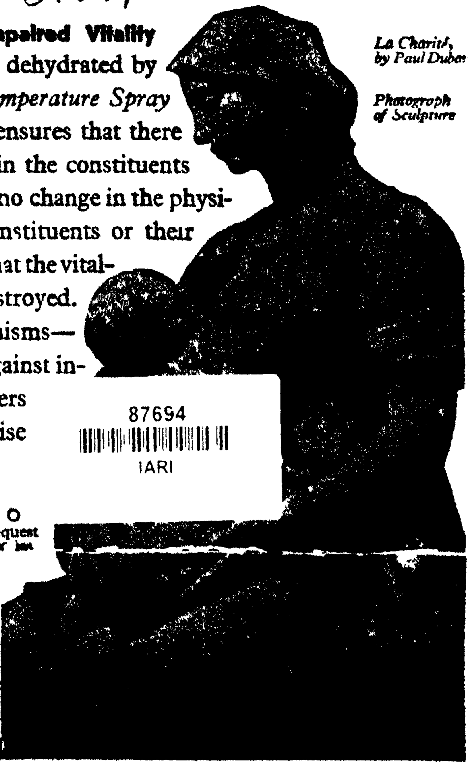

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THE PRACTITIONER

No. 796 OCTOBER, 1934 Vol. CXXXIII

RECENT ADVANCES IN TREATMENT

INTRODUCTION

IN October last the opportunity of reviewing modern treatment in general practice was taken in a Special Number of *The Practitioner*, and now at the beginning of this medical year the same plan is being followed by a Special Number dealing with recent advances in the various branches of medicine, though not with exactly the same diseases as those considered a year ago. Other numbers on these lines, such as those in January last on the treatment of diseases by diet and in July on nervous disorders in general practice, will be continued at intervals so as to concentrate attention on a group of allied affections. In the ordinary monthly issues some, but not all, of the articles on much the same subject will continue to be grouped together, while the other contributions will be concerned with different subjects. In this way the numerous parts of the very extensive field of medicine will, it is hoped, receive in due course their fair share of notice.

Although this Special Number deals specifically with recent advances in treatment, which are covered in some seventeen articles, the seasonal incidence of disease may sometimes, as at this time of year, call for special notice. This number therefore opens with a very practical and timely article on some acute infections of the autumn; this naturally includes the cold which is so common after the return from the holiday, and which, it must be feared, is often regarded by lay critics in the light of a reproach to the medical profession.

SOME ACUTE INFECTIONS OF THE AUTUMN

By A. H. DOUTHWAITE, M.D., F.R.C.P.
Assistant Physician, Guy's Hospital; Honorary Physician, All Saints' Hospital.

THERE is a peculiar perversity about the autumn in that, year after year, it produces with monotonous regularity an outbreak of acute catarrhal infections in a population believing itself singularly immune by virtue of recent summer holidays. It appears to be only too true that residence in the pure air of the country or seaside, although invigorating and indeed in many ways essential to well-being, nevertheless results in a diminution of resistance to those catarrhal organisms with which we come in daily contact in city life. Other factors leading to this end are the sudden restriction of exercise and the return to a sedentary existence, and the treacherous nature of our climate in the latter months of the year.

The common cold is ubiquitous by the end of October and, although as a rule causing but transient inconvenience, is in the unfortunate few but the preliminary to graver and even fatal mischief. How often indeed does coryza usher in acute bronchitis, or cause a flare-up of a latent chronic bronchial infection. Again how constant is the history of a cold, and of sore throat in patients whom we find in the throes of an acute streptococcal fever.

CORYZA

It needs some temerity to advance suggestions for the prevention and treatment of the common cold, yet although its complete avoidance is an unattainable ideal, a good deal can be done to diminish its incidence. First and foremost, the value of adequate house ventilation should be taught to the populace. The tendency to sit in over-heated rooms or railway carriages in which the windows are closed and the air vitiated by the catarrhal organisms of others is still extraordinarily widespread; this factor alone is probably responsible for the majority of autumn colds, and once these are widespread they will continue to flourish by infection from one to the other. The frequency with which the early symptoms of coryza appear shortly after waking in the morning suggests some faulty habit at the close of the day or during the night. The former is actually that of spending the evening in front of a fire while irritating the mucous membranes with tobacco smoke and not infrequently liberal doses of whisky. For those who suffer frequently from colds, it is well worth recommending half-an-hour's brisk walk just before retiring—simple but effective advice which is always followed with the greatest reluctance. At night, even if the windows be open, most people use an excessive amount of bed-clothing; this habit in conjunction with the entirely unnecessary custom of increasing the underclothing in the autumn, effectively prevents the skin from exercising one of its important functions, namely, that of regulating the body heat. From a warm bed our potential patient clambers into a hot bath and thus renders his body quite unfit to react normally to the changes of temperature which the day has in store. Light clothing in winter, to be supplemented by an overcoat in very cold weather, bed-clothes sufficient to preserve comfort without undue heat, a hot bath at night, and a cold bath in the morning, and daily exercise, even if it can only be a short walk, will go a long way to reduce attacks of coryza from six or more to one or even none in the year. One agency in the production of the common cold which usually defies all forms of treatment is snoring, but as this process, so desiccating to the respiratory mucous membranes, is by no means confined to the autumn, the thankless task of advising on the habit can conscientiously be avoided.

Encouraging reports have been forthcoming of Glegg's treatment for a cold in its early stage when the nasal mucous membrane is dry and irritable, and before the infection has spread into the trachea. It consists of the application, by means of a funnel, of a teaspoonful of paraffinum molle album and paraffinum liquidum (1 in 4) into each nostril; the patient lying on his back during the process; this is carried out several times a day. Serious consideration must also be given to the value of prophylactic inoculations. The injection of three doses of vaccine at weekly intervals rising by increments of often over 200 per cent. is usually devastating to all but the hardiest. If, however, the inoculations be administered over a longer period in the following manner, beneficial results will accrue with great frequency. Using, for instance, the stock anti-catarrh vaccine as supplied by Parke Davis and Co., the dosage should be 0.1, 0.15, 0.2, 0.3, 0.4, 0.4, 0.5, 0.7 and 1 c.cm. Should the patient, however, evince any sign of a constitutional reaction, it would be folly to attempt to complete a gradation of this type. The dose should, in fact, be reduced to that which preceded the evocative amount, and for several weeks this should be repeated. Many patients can never tolerate a larger quantity than 0.5 c.cm. After giving nine or ten doses at weekly intervals, thereafter throughout the winter a fortnightly dose of half the quantity of the maximum amount attained should be injected.

TRACHEITIS

This, the short intermediary stage between a receding coryza and commencing acute bronchitis, offers a hope of arrest provided that measures be taken promptly. The hoarse voice, painful cough, sensation of rawness beneath the sternum, all point to the descent of the infection towards more vulnerable areas. Treatment is simple; it must aim at the production of cutaneous vasodilatation, sweating and allaying cough. For the first two desiderata the old-fashioned mustard bath followed by a bed well warmed and by hot whisky and water are all that are required. The cough should be controlled in the first place by keeping the room temperature at 60° F. day and night. This is a most important rule at this and at any more advanced stage in the disease.

Laryngeal irritation and the "stuffiness" of the nose, which distresses the patient and induces mouth breathing, yield promptly to the inhalation of steam impregnated with volatile oils. The following mixture is of great value :—

℞	Menthol	gr. x
	Ol. eucalypt.	♏ xv
	Tinct. benz. co.	ʒi
	Alcohol	ad ℥i

Sig.—Half a drachm in 1 pint of hot water. The vapour to be inhaled for 10 minutes every two hours.

Finally, drug administration should combine a substance which depresses the respiratory centre with one acting as an expectorant in order that protective secretion should be poured out on to the dry, inflamed surfaces. During the day-time the following mixture should be given :—

℞	Diamorph. hydrochlor.	gr. 1/16
	Vin. ipecac.	♏ xx
	Syr. prun. virg.	ʒi
	Aquam	ad ℥ss

Sig. ½ oz. t.d.s., p.c., ex aq.

At night-time the ideal is a combination of ipecacuanha and opium in the form of Dover's powder.

ACUTE BRONCHITIS

Within 48 hours the success or failure of these efforts will be established, and if the cough continues with production of a tearing pain in the chest, and if some degree of pyrexia is apparent, involvement of the larger bronchi becomes more and more certain, although it may be several days yet before the classical auscultatory signs are manifest. The treatment as regards the room temperature is the same, and in order to secure an even distribution of heat the bronchitis kettle is of the utmost value. This must be kept steaming day and night, for the promptitude with which relapses set in after any considerable fluctuation of room temperature is one of the most remarkable features of the disease. The added moisture to the air is also of direct use in helping to soothe the inflamed mucous surfaces, which it must be remembered, are red, swollen and dry at this stage. That any advantage is to be gained from the addition of volatile oils to the water is problematical; they certainly help to keep the nasal passages clear, and possibly may benefit the upper reaches of the bronchial tree as well. Their value as antiseptics is, of course, negligible. Bearing these points in mind, if it be decided to use these substances, the following mixture answers the purpose well :—

℞	Ol. santal. - - - - -	♏ x
	Creosoti - - - - - -	ʒss
	Ol. cucalypt. - - - - -	♏ xx
	Ol. terebinth. - - - - -	♏ x
	Alcohol - - - - - -	ad ℥i

A teaspoonful of this mixture should be added to each pint of water in the kettle. Before prescribing it, it should be remembered that it is rather expensive, but the psychological effect of the issuing exotic odours is not inconsiderable. The linseed poultice is unquestionably helpful in this dry, painful stage, and should be used in preference to its more modern substitutes. The rubefacient action can be reinforced by sprinkling the surface of the poultice with methyl-salicylate liniment. The efficacy of the poultice in treatment is certainly in part dependent upon its providing a source of moisture to be inhaled.

A great difficulty is to keep the room warm and yet to secure ventilation. If there be a north or north-east wind blowing, the patient will recognize the fact within a few minutes of opening the window. In such cases ventilation must be indirect through opening the door of the bedroom. The diet needs restriction only in the direction of meat and fats, and may otherwise be as full as is demanded by the appetite, which is usually fairly well maintained if the bowels are regulated initially with calomel, and subsequently with senna. Sleep should be secured by the use of ten grains of Dover's powder, which should be continued even if nausea is induced, as the associated expectorant action is precisely what is required.

To consider now the indications for the use of certain expectorants and of respiratory sedatives in bronchitis. The older classification into stimulating and sedative expectorants cannot be maintained, for it is unscientific and at times misleading. In order to obtain guidance in the choice of drugs we must adopt the scheme of the pharmacologist, and rely upon the sites of action for purposes of differentiation. There are thus found to be four main groups: (1) Reflex, i.e. drugs which act by virtue of their emetic properties exerted through irritation of the gastric mucosa. Sub-emetic doses effect expectoration and the action is usually prolonged. Such substances are ipecacuanha, antimony, squill, the saponins (e.g. senega and grindelia) and ammonium carbonate. (2) Central, i.e. drugs stimulating the bronchial centre, e.g. apomorphine. (3) Peripheral stimulants of secretory nerve-ends, e.g. pilocarpine. (4) Bronchial gland stimulants. The action is partly true stimulation by virtue of drugs excreted through the mucosa, e.g. pix, creosote and benzoin; partly a simple salt action increasing the non-colloidal constituents of the blood and consequently favouring secretion, e.g. ammonium chloride and alkalis. In addition to this effect, iodides appear to have a specific action. It may be taken as a general rule that group 1 is suitable for the first stage of acute bronchitis and group 4 for the later muco-purulent and chronic states. Groups 2 and 3 are used only in exceptional circumstances. A good mixture for use in the day-time is thus prepared as follows :—

℞	Diamorph. hydrochlor.	gr. 1/16
	Vin. ipecac.	♏ xxv
	Syr. senegae	♏ xl
	Ext. grindellae liq.	♏ xv
	Syr. prun. serotin.	ʒ i
	Aquam	ad ℥ss

Sig.—½ oz., t.d.s., p.c., ex aq.

When, after the first few days, the cough ceases to be painful, and is accompanied by expectoration, at first mucoid and later muco-purulent, respiratory depressants should be omitted during the day-time and used only at night if simple soporifics, e.g. chloral, fail to secure adequate sleep. At the same time a change to the expectorants of group 4 is indicated, partly because the prolonged use of gastric irritants is obviously undesirable, partly because the direct expectorants have a peculiarly beneficial action in rendering the sputum less tenacious and in exerting a mild antiseptic action. For this purpose then the following mixture might be used :—

℞	Ammon. chlor.	gr. v
	Sod. bicarbonat.	gr. xii
	Sod. chlorid.	gr. x
	Pot. iod.	gr. vii
	Syr. picis liq.	ʒ i
	Aquam	ad ℥ss

Sig.—½ oz., t.d.s., p.c., ex aq.

Any form of poulticing must now be avoided, but the care of the room temperature is still an important point. It is definitely unwise to omit the steam kettle before the patient is well on the way to recovery.

Not infrequently the dyspnœa of an attack strikingly resembles that of asthma. In fact, the underlying cause is the same, and referable to bronchiolar spasm. Should, therefore, distended lungs, high-pitched wheezing and prolonged expiration feature in a case of acute bronchitis, great benefit will be experienced from an injection of three minims of adrenaline, following up by a grain of ephedrine every four hours. The spasmodic stage usually subsides with the first appearance of sputum, and therefore these drugs are required for but a short time only.

The period of convalescence should be spent, if possible, on that part of the south coast which lies westwards of Shoreham. In fact, the warm, damp atmosphere of Cornwall is particularly suitable to the bronchitic.

The treatment of acute bronchitis does not finish here. On return from the seaside the patient should be most fully investigated to determine, if possible, the cause of the attack, e.g. infected sinuses, and, in particular, errors of posture and breathing should be corrected by physical exercises.

ACUTE TONSILLITIS AND STREPTOCOCCAL FEVER

These two conditions are associated in natural sequence and as encountered by a physician who is, of course, rarely consulted about the former in the absence of the generalized infection. The incidence according to our case records attains a peak in the autumn and a slightly higher one in the late spring. The disease is usually ushered in by a follicular tonsillitis sometimes unaccompanied by indications of unusual severity, sometimes suggestive of a virulent infection from the start. As a rule the patient has taken to his bed for two or three days and has then returned to work although by no means fit. Within forty-eight hours he is seized with headache, rigors and a temperature rising rapidly to 103° F. or more. The throat may now appear normal; often it is diffusely red, dry and glazed and there is trivial enlargement of the glands at the angles of the jaw. The temperature swings daily from 99° to 104° F. with rapid pulse (120), dry, red, or furred tongue, nausea, often vomiting, extensive erythema, sweating, and later anæmia and possibly severe diarrhœa. In the minority of cases the spleen is palpable and tender. Albuminuria is a variable feature. The diagnosis rests upon the history, the clinical features enumerated and a positive blood culture. Repeated bacteriological examinations of the urine may reveal the presence of streptococci in one or more specimens. Fortunately, few of these patients develop secondary foci of sepsis, e.g. empyema or septic arthritis, for in these the prognosis is grave. The remainder usually recover spontaneously in ten days to three weeks. A leucocyte count of twelve to eighteen thousand is usual, the polymorphonuclear cells forming about eighty per cent. Lower counts have in our experience been associated with a fatal termination.

In the stage of follicular tonsillitis two preparations are of outstanding value. The first is chromic acid (5 per cent.) which may be used as a gargle or paint. It is very astringent and unpleasant, but telling in its results. After gargling with this preparation its effect can be enhanced by using a mouth wash of hydrogen peroxide. This discolours the mouth black, but staining does not persist. The other topical application is a mixture of iron perchloride and chlorate of potash (Mist. pot. chlor. et ferri (G.H.P.)). A tablespoonful of the mixture can be gargled and then swallowed, thus ensuring that its contents shall reach the inflamed surfaces. The subsequent partial excretion of potassium chlorate in the saliva is also advantageous.

As to the treatment of streptococcal fever, apart from the usual indications for a pyrexial illness, e.g. fluids and alkalis in plenty, fruit juice, glucose, milk; tepid sponging; soporifics, and above all, efficient nursing, it must be conceded that nothing more is usually needed. It is, however, impossible to tell at the beginning which case will recover and which patient will die, therefore any further line of treatment of apparent value should not be withheld, for example, the use of scarlatinal antitoxic serum. The results from its use are sometimes so dramatic as to put coincidence out of court. After the intravenous injection of 10 c.cm. the temperature may fall by crisis, the spleen recede and the patient be to all intents and purposes fit and well within a day or two. Out of ten cases, perhaps two will react in this manner. If three injections at six-hour intervals have no effect, it is useless to continue. Presumably the variability of the response is attributable to the variations in the types of streptococci responsible for the illness. The closer they approach to the scarlatinal strain, the greater the chance of success. The best evidence available of the occasional efficacy of the serum in streptococcal disease was presented by a case of severe streptococcal meningitis with dramatic recovery.[1] Intramuscular injections are probably as suitable as those given into the blood stream and far less likely to cause unpleasant immediate reactions. Subsequent serum sickness with joint pains, fever and urticaria, occurs with remarkable regularity, but can be mitigated by the administration of calcium gluconate in drachm doses daily during, and for a week after, the injection period.

Finally reference should perhaps be made to influenza as a frequent visitor in the late autumn. The disease, however, when uncomplicated needs only rest and the general treatment of a feverish illness. When accompanied by complications due presumably to the synergism of catarrhal organisms the treatment must clearly depend upon the particular manifestations some of which we have considered above.

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ADVANCES IN TREATMENT OF DISEASES OF THE RESPIRATORY SYSTEM

By R. A. YOUNG, C.B.E., M.D., B.Sc., F.R.C.P.
Senior Physician, the Middlesex Hospital and the Brompton Hospital for Diseases of the Chest.

IN the year which has elapsed since A. J. Scott Pinchin and H. V. Morlock[10] gave their clear and critical presentation of "Recent Views on Diseases of the Lungs and Pleura" in this journal, there are not any dramatic or notable advances to record. In the following article I propose to review, in the literal sense of the word, some of the advances described by them, and to devote some attention to measures designed to prevent or lessen the incidence of these diseases, and to those likely to mitigate their after-effects. The protective, recuperative and compensatory aspects of treatment in this group of diseases are important and deserve more attention than they usually receive.

Fortunately, in view of its essential importance to active life, the reserve of respiratory or "vital capacity," above that necessary for mere existence at rest, is very liberal; indeed, it is probably relatively greater than in regard to other systems and organs, yet it must be remembered that the effects of respiratory disease are often destructive and that the processes of repair not infrequently lead to serious diminution of functional capacity. Even a moderate permanent lessening of the vital capacity is a real handicap after recovery, and especially in subsequent disease. The processes of healing and repair often lead to pleural adhesions, to fibrosis and calcification of areas of lung tissue, and sometimes to progressive emphysematous changes. These must be carefully watched and, if possible, controlled. Sir Charlton Briscoe recently drew attention to these questions and the modes of dealing with them, in an interesting lecture on "Prevention in Respiratory Diseases."[2]

DISEASES OF THE UPPER AIR-PASSAGES

It may be questioned if sufficient attention is paid to prevention and treatment of some of the minor respiratory maladies, particularly those of the upper air-passages. The common cold and its consequences are often held up as a reproach to medical treatment, though the fault is usually with the sufferers who decline to take the conditions seriously. The rôle of vaccines, autogenous and stock, in the prevention of this troublesome condition is still under discussion, and this is not surprising since there is reason to class the cause of coryza among the group of virus or filter-passing organisms; but many practitioners are convinced of their usefulness in lessening the severity of the attacks in susceptible persons and of their value in preventing the more serious complications, such as acute nasal sinus infections. In my experience they have seemed helpful in these respects, especially in elderly mild bronchitics and notably in preventing their more serious attacks. If stock vaccines are given, it is advisable to begin with small doses in the mid autumn and work up to a full dose, which can be repeated every four or five weeks throughout the winter and early spring. Great care should be taken to avoid giving a vaccine when there is any suspicion of commencing infection, as this conjunction seems often to lead to a more severe attack and is to some extent responsible for the disrepute of vaccine treatment. I am also averse to using prophylactic vaccines in the presence of any chronic non-tuberculous lung disease, as they seem generally to fail. Charlton Briscoe[3] urges the value in prevention of keeping the feet warm and dry. It seems now to be agreed that vitamins, notably A and D, play a part in preventing and combating infections of mucous membranes. It is to be hoped that the time is not far distant when every patient with a cold will stay in bed or, at any rate, in one room for at least 24 to 48 hours.

The condition of the mouth, nasal cavities, the oropharynx and the bucco-pharynx is a very important consideration in all patients with any respiratory abnormality. A routine examination may reveal conditions, such as polypi, suppurative sinus disease, acute or chronic, chronic mouth breathing or chronic tonsillitis, any of which may be a source of danger, particularly when respiratory infections are prevalent or epidemic. Effective treatment, medical or if necessary surgical, of these conditions may lead to complete cure of chronic cough and prevent recurrent acute catarrhal infections. As a protective measure the vogue for saline watery nasal douches is giving place to oily nasal applications, such as endrine, pinoleum, metaphedrine and chloretone inhalant, applied either by direct application to the mucous membrane, in the form of drops by a small glass tube, or in fine subdivision by means of a nebulizer. Most of these contain ephedrine or menthol, often with some antiseptic. The cure of mouth breathing in childhood is so important that when it is present parents should be urged to take every measure to secure nasal breathing by necessary surgical procedures and by adequate instruction in breathing exercises. Many hospitals now recognize the importance of the latter factor and have started departments for remedial exercises.

BRONCHIECTASIS

The treatment of bronchiectasis remains one of the dark corners of medicine, though definite advances have been made and improved measures of amelioration have been introduced. Unfortunately the condition seems to be more common than was formerly supposed, and it may be doubted if this is entirely due to improved methods of diagnosis, although lipiodol has certainly served to reveal many unsuspected cases and to establish the existence of " dry " or " silent " bronchiectasis.

It so frequently results from severe bronchitic and pneumonic infections in early life, delayed or incomplete resolution of pneumonia in adult life, or from the fibrosis and contraction after destructive processes, such as abscess, that it is much to be hoped that in future more attention will be given to these conditions, with a view to prevention. In any case in which incomplete expansion of the lung occurs after any of these conditions, it is desirable that X-ray films should be taken, that convalescence should be prolonged and measures taken to promote expansion by local treatment and by exercises. Occasionally phrenic paralysis, either temporary or permanent, may be helpful when other measures fail to secure re-expansion, possibly by allowing the partially collapsed lung to contract without dilating the bronchi.

The medical measures of treatment are almost exclusively palliative. None the less they are often very helpful and this is especially true of postural drainage or " tipping." H. P. Nelson[9] has recently studied this method of treatment anatomically and has made some very valuable suggestions with a view to making postural drainage more continuous and more effective. After localization of this disease by antero-posterior and lateral, or stereoscopic films, he suggests treating lesions in the upper zone in the sitting position, those in the middle zone by getting the patient to lie flat and those in the lower zone with the foot of the bed raised, while lesions anterior to the tracheal axis are treated in the supine position, those on the tracheal axis in the corresponding lateral position, and those posterior to it in the prone position.

Collapse treatment by artificial pneumothorax, though often practicable owing to the frequent absence of adhesions, does not offer any prospect of cure and can only relieve the symptoms temporarily. Thoracoplasty also should not be recommended as a routine, since it does not lead to obliteration of the cavities, though it sometimes gives permanent relief in localized basic cases. An extra-pleural pneumolysis by paraffin plombage has in my experience been successful in apical or upper-lobe bronchiectasis. Lobectomy in unilobar disease in young subjects seems likely to be the most satisfactory surgical procedure; but the operative mortality is still considerable, though much lessened recently by improved technique.

ASTHMA

The treatment of asthma is one of the most difficult problems in medicine, not because treatment is essentially ineffective, but on account of the complex and varied causation. For the relief of the actual paroxysm many useful palliative measures are available. The difficulty is to prevent the attacks, owing to the numerous factors concerned in their causation. The fundamental condition seems to be an unduly sensitive broncho-motor mechanism—so that spasmodic conditions in the bronchioles can be induced by so many different exciting causes. The allergic factor has in recent years attracted much attention and is doubtless paramount in a considerable proportion of the cases. Unfortunately the allergic condition is rarely confined to one exciting substance or group of substances, except in cases starting later in life, when it is often occupational in origin.[3] For such cases, desensitization is well worth a trial, especially by the " rush " method originally introduced by J. Freeman[4] for hay fever and hay asthma. This consists in injections of graduated small doses of the suitable antigen every 1½–2 hours in a 14-hour day.

In some instances the asthmatic paroxysms seem only to occur in association with catarrhal infections of the air passages, while in other more persistent cases, bacteriological investigation may reveal chronic infection by such organisms. In these cases carefully devised vaccine treatment sometimes gives dramatically successful results. It is usually desirable to test the dermal reaction to the vaccine before giving it, as if there is no reaction there is little probability of success. Asthmatic patients are often extremely sensitive to vaccines, it is, therefore, best to proceed on the principle of desensitization rather than that of immunization. L. E. H. Whitby[12] recommends starting with minute doses, a tenth of a million or less, with gradual increases at three-day intervals until the maximum dose which does not cause a reaction is reached. After this a long series of doses of this strength may be given at longer intervals of a week or more. Reactions should be avoided, since they may induce a severe attack of asthma, or even a condition of *status asthmaticus* of distressing and even alarming character.

The nasal factor in asthma should always be remembered and every case examined for an abnormality. Even when it is only a secondary factor in the production of the paroxysm, treatment of pathological conditions may prove helpful, and even local cauterization of the septum may give relief. Injections of adrenaline and pituitrin, alone or in association, have proved to be the asthmatics' greatest boon and have materially lessened their disabilities. The discovery of ephedrine and its substitute, ephetonin, with the advantage that they are effective when given by the mouth, has also enlarged our means of cutting short or preventing the actual attacks. Unfortunately some patients complain of uncomfortable effects, notably restlessness and sleeplessness after their use. Inhalations of adrenaline and other antispasmodics, either with or without oxygen — such as in the apneu and bronchovydrin methods — are often helpful and are worth trial in difficult or protracted cases.

PNEUMONIA

The serum treatment of pneumonia merits a brief review in the light of further experience of its use. There is no doubt that Felton's serum is active and indeed potent, and that its concentrated form enables large numbers of units to be administered. When given intravenously it often leads to acute anaphylactic shock, so that the patient should be tested before its administration by intradermal and conjunctival tests with a 1 in 10 dilution of normal horse-serum, and if sensitive it is best to start with the usual small doses at first, for purposes of desensitization, though adrenaline, given promptly, controls the symptoms of shock most dramatically. Severe delayed "serum sickness," with all its attendant discomforts of pyrexia, urticaria and joint symptoms may also occur, so that it does not appear to be necessary to give the serum in young adults with Type I infection, in view of the low mortality in this country of that form of the disease. The expense and the time involved in its administration must limit the use of Felton's serum. In an admirable summary of the present position in regard to this serum J. A. Ryle and R. L. Waterfield[11] state that they would hesitate to employ it in any subject with known allergic tendencies, and would not use it in children, in most adolescents, or in advanced age; they regard it as indicated in adults causing anxiety at an early stage and showing a poor leucocytic response, and in alcoholics. To their recommendations may be added cases with a bad previous history of lung infections, those with high blood-pressure and renal disease. The serum has been given as late as the fifth day with apparent benefit, but the earlier it is given the greater likelihood of success. Wherever possible, the type of pneumococcus should be established before the serum is given, since in cases due to Type III or Group IV it is useless. Type II infections are more severe with a higher mortality than those due to Type I; there is, therefore, more need for the serum in Type II cases. Unfortunately it does not seem to have any effect on complications such as empyema or meningitis.

Oxygen inhalations, either alone or with a proportion of Co_2, are now employed earlier and more continuously than in the past. The method of giving it by the nasal catheter is convenient and uses much less oxygen than the older methods with a funnel or mask. The cylinder should be fitted with a fine adjustment and the oxygen warmed by passage through a Woulfe's bottle and passed through at a rate of about three or four bubbles a second. A No. 9 catheter, the end moistened with oil, should be inserted a short distance into one nostril, and fixed by strapping applied to the cheek. In my experience patients soon get accustomed to it after the discomforts of the first few minutes and welcome its prolonged use.

The oxygen tent is a more effective but more expensive method of administration. Its use has been strongly recommended by E. P. Poulton who, with the help of the Medical Research Council, has established an Oxygen Therapeutic Service. On application to the Secretary, 25, Upper Wimpole Street, London, W.1, it is possible to send out at the request of any medical man an oxygen tent in the charge of a fully-qualified physical therapeutist, only the actual expenses being charged for. The value of the oxygen tent has been established in America where it has been widely used. It is now being employed in this country, especially after severe operations on the chest as well as in pneumonia and other conditions leading to cyanosis and dyspnœa.

After-care.—It may be well in connection with the treatment of pneumonia to insist again on the importance of after-care and the necessity of urging the patient to remain under observation until the area of lung involved has completely resolved or until measures have been taken to prevent later ill-effects, such as fibrosis and bronchiectasis.

ABSCESS OF THE LUNG

Although in recent years considerable advances have been made in the diagnosis and treatment of this condition, it is still a difficult problem. A full critical review of this subject has recently been published by James Maxwell.[6] It is fortunate that a considerable proportion of cases, possibly as high as 30 per cent., clear up completely under medical or expectant treatment.

Operations on the mouth, nose and throat are responsible for a considerable number of cases, and it is desirable, as a measure of prevention, to ensure that the conditions under which anæsthesia is induced and the operation is performed are such as to prevent aspiration into the bronchi.

There is little fresh to record in the medical treatment, save that the more continuous methods of postural drainage advocated by H. P. Nelson,[9] to which reference has already been made under bronchiectasis, seem worthy of trial. The surgical treatment is still a matter of debate. That some form of active interference is necessary in cases in which recovery is not well advanced in from six to eight weeks is generally recognized. The decision on what form it shall take is both responsible and difficult. Bronchoscopic aspiration has been extensively recommended and can be tried comparatively early. In my experience it has been disappointing and the results in no way commensurate with the discomforts involved, though it must be admitted that some cases clear up with this treatment. Artificial pneumothorax, although it has undoubtedly some successes, is now generally regarded as too dangerous, except in very exceptional cases of abscesses near the hilum.

Phrenic paralysis, temporary or permanent, is rarely sufficient except in cases in which the position of an abscess in the middle zone is so altered in relation to the bronchi by the operation that it is thereby enabled to drain effectively. The drainage of the abscess by thoracotomy, with a preliminary stage to ensure effective pleural adhesion, is the most generally successful method. In some very chronic abscesses, which are complicated by localized fibrosis and bronchiectasis, lobectomy promises to be the only method to secure permanent cure, but the operation is a severe one and can only be recommended in young subjects, whose outlook would otherwise be gloomy.

PULMONARY TUBERCULOSIS

Gold treatment.—This form of treatment has been in use for ten years. Even now its ultimate place in the therapy of this disease is hard to forecast. Fishberg stated that it has been largely discarded, especially in America. On the Continent and in this country it is still extensively employed, though in doses much smaller than those originally suggested by Møllgaard. It is generally regarded as being most useful in early cases, or in lesions of the exudative type; but it appears sometimes to help in more chronic disease, particularly in promoting the disappearance of bacilli from the sputum, though this is frequently not permanent. There is increasing evidence that it is helpful in arresting active exudative lesions in the opposite lung, occurring in the course of artificial pneumothorax treatment, or after thoracoplasty. It may also help to reduce the temperature, in some cases with slight pyrexia. Sanocrysin is perhaps the most generally used preparation and is given intravenously, but allochrysin and myochrysin are used as alternatives. For intramuscular use, allochrysin, solganol B oleosum, oily myochrysin and oleo-sanocrysin are also available.

The usual initial dose now given is 0·01 gm. or less, in place of the original dose formerly suggested of 0·5 gm. The usual series is 0·01, 0·05, 0·1, 0·2, 0·25, 0·3 with gradual increase up to a maximum of 0·5. If, however, reactions occur with any dose, subsequent doses should be the same or less. The doses should be given every five to seven days. The total amount in an ordinary course should not exceed 5 grammes. After an interval of a few months a second course may be given if necessary. If given intravenously, the sanocrysin should be dissolved in 2–5 c.cm. of sterile distilled water, the larger quantity being used for doses over 0·3 gm. Charles Mayer[7] uses chrysalbin and recommends its use in a 5 per cent. solution in 10 per cent. gluconyl. Some authorities recommend giving glucose to drink on the day of injection. It is important to recognize that gold preparations can cause toxic symptoms and therefore require cautious use. Some of these, such as fever, malaise and loss of weight, are due to the effect on the tuberculous lesions; others are due to the toxic actions of the gold, notably gastro-intestinal disturbances, stomatitis, skin rashes, albuminuria, hæmaturia and jaundice. Severe sweating occasionally results. Gold preparations should not be given to patients with albuminuria or renal disease. A useful critical review of the present position is given by Beaumont and Dodds.[1]

Collapse treatment.—Bilateral pneumothorax is now being more widely used in selected cases of disease of both lungs. It requires special care in regard to the degree of collapse, the pressures in the two pleural cavities and the spacing of the refills.

Phrenic evulsion is now extensively used and is often a valuable means of giving partial rest to active lesions, even apical ones, provided there are not very extensive adhesions. Temporary paralysis by crushing the nerve and any accessory branches seen, in two places close together, by artery forceps, is a recent advance in technique. It gives a paralysis lasting three to four months. In an attempt to increase the value of phrenic paralysis, division of the scalene muscles or scaleniotomy has been employed. It seems doubtful if its results justify the additional interference.

Thoracoplasty.—In selected cases in which artificial pneumothorax fails or is impracticable, thoracoplasty is increasingly employed and when due care is taken in selection is a very successful mode of treatment.

Bilateral partial thoracoplasty has been suggested and actually carried out successfully by Gravesen.[5]

Recently much attention has been devoted to *cavities* and their dangers. The subject has been well summed up by Burrell[3], who points out that a tuberculous cavity in the lung is a potential danger, but that treatment directed to its closure may involve danger greater than that of the cavity. A dry cavity should be treated like a chronic fibrotic case without cavity. When a cavity is accompanied by much expectoration, attempts to close it by collapse methods are indicated, and when these are contra-indicated, limitation of the movements of the chest by sandbags on the side involved is useful. In acute cases with cavity formation, artificial pneumothorax is the method of choice when possible.

Apicolysis or extra-pleural pneumolysis by paraffin or other plombage is still on trial. It is to be hoped that improved methods may be evolved, because the principle is good, but at present it often fails.

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RECENT ADVANCES IN THE TREATMENT OF ASTHMA AND HAY-FEVER

By GEORGE W. BRAY, M.B., M.R.C.P.

Physician in charge of the Children's Department, Prince of Wales General Hospital, Tottenham; Assistant Physician, Princess Elizabeth of York Hospital for Children, Shadwell; Clinical Assistant, Asthma Clinic, Guy's Hospital; Late Asthma Research Scholar, The Hospital for Sick Children, Great Ormond Street, London.

Working with a part-time grant from the Asthma Research Council.

IN dealing with such a comparatively new branch of medicine as the so-called "Allergic diseases," the familial relations and similar etiological basis of which have been fully recognized only since the war, it is a difficult problem to assess what should be discussed in an article dealing with recent advances in their treatment. In July, 1929, *The Practitioner* published a Special Asthma Number in which widely-differing views were expressed as to etiology and treatment. This is a very profitable starting point, and I propose to discuss how those divergent opinions are becoming more unified as the result of investigations carried out during the past five years. In that number, Dr. Hurst dealt with the psychological and reflex aspects, Sir William Willcox with focal sepsis, Sir James Dundas-Grant with nasal abnormalities, Professor Storm van Leeuwen with climatic factors, Dr. John Freeman with tissue damage, Dr. Adam with toxins, Mr. McDonagh with the hydration of protein particles in the plasma, while Dr. Francis discussed asthma as a vasomotor neurosis. All recommended methods of treatment based on their view of the etiology and all claimed a favourable percentage of good results. As Professor McDowall remarked at the time, when a number of competent investigators arrive at apparently divergent results it is probable that they are all right. From investigations carried out during the past five years the majority of these views may be reconciled in the following manner.

In the first place, it is definitely agreed that the tendency to develop allergic diseases runs predominantly in certain families who comprise from 2 to 10 per cent. of the population of some countries. In eliciting the number of relatives affected it is essential that the enquiries should embrace all possible allergic manifestations and not only the one from which the patient under observation is suffering. Commonly I see cases that have been described as non-familial in which careful questioning has elicited the presence of numerous other allergic manifestations in parents or offspring. It is only in a minority of patients that such an hereditary tendency cannot be determined, and when this does occur a definite history of a severe illness shortly before the onset of the allergic condition can usually be obtained. In asthmatic children this has been quite commonly a pneumonic process complicating an infectious disease, such as whooping cough or measles; in adults, pneumonia, influenza or bronchitis play a similar part. In food allergy in children the initial illness is frequently gastro-enteritis; and in adults, enteritis, colitis or dysentery may have been the forerunner. In skin conditions the effect of trauma and friction is apparent. From these facts it may be concluded that in the majority of cases the allergic condition is the result of either an allergic hereditary predisposition or of some severe tissue damage, and in some other cases to the effects of both acting together.

Secondly, once the ground has been prepared the most important factor is some specific sensitizing substance which is absorbed by inhalation (animal emanations, dusts, pollens, moulds and fungi), ingestion (foods and drugs), injection (serums, drugs, bites and stings), infection (bacteria, worms), or by contact (fabrics, chemical or physical agents) and carried by the blood or lymph stream to the reacting organ. The commonest sensitization is to some article of environment or diet, though both patients and practitioners seem to pay more attention to some unusual sensitization than to the more common ones. For example, a chronic asthmatic stated that he always developed symptoms whenever he used glue and so had avoided it during the past ten years. On testing he proved much more sensitive to house dust which reminded him that he always felt a tightness in the chest and was wheezy in dusty places; but this daily occurrence did not impress him nearly as much as the glue sensitivity which he had avoided for ten years and had still remained asthmatic.

In practically all cases of asthma and hay-fever in the earlier stages contact with a specific sensitizing substance has originated the attacks. In gross sensitivity each contact, however slight, leads to a reaction; but in less sensitive individuals the general tendency is for the body to avoid or overcome the tendency to react. It is in this latter group with intervals of comparative freedom that other non-specific factors act. If, during exposure to the specific sensitizing substance, the resistance of the body is lowered by any of a group of non-specific, non-allergenic factors either psychic, endocrine, nasal, toxic, dietary or environmental, then the reaction will ensue. These factors may be compared with catalysts which hasten chemical reactions, and help to explain why a person only becomes asthmatic with a cold, during states of emotion or excitement, after exertion, following dietary indiscretions or in certain atmospheres. For example, take the patient who only gets asthma with a cold. In my experience bacterial sensitization does not play any part in the etiology of the asthma, but the lowering of the local resistance of the mucous membranes of the respiratory tract and the general resistance of the patient makes him more susceptible to some air-borne sensitizing agent such as feather pillows or house dust. The proof of this statement is that if the specific sensitizing substance is determined and removed or the patient desensitized further colds may arise without the patient developing any asthmatic symptoms. By giving vaccines the practitioner may produce a temporary immunity to colds and so prevent the asthmatic spasms, but doubtless the more permanent measure is the removal of the specific sensitizing substance.

Again, many patients ascribe their symptoms to dietary indiscretions, and the asthmatic spasm may be brought about in one of four ways. In the first place the food may contain some substance to which the patient is specifically sensitive at all times. Secondly, many patients are only sensitive to specific foods when their digestive power is lowered. Quite a large percentage of asthmatics, and especially children who are more commonly food-sensitive than adults, show a diminished secretion of acid gastric juice or evidences of mucous gastritis, and so improperly digested foods gain easier access to the blood stream and hence produce reactions. Thirdly, a gross attack of indigestion, and especially if the patient takes large amounts of alkalis for its relief, may make the patient less resistant to some specific substance absorbed through some parenteral route and hence initiate an attack.

An asthmatic patient of mine also suffers from a duodenal ulcer; when the ulcer causes symptoms he is free from asthma even while sleeping on down pillows to which he is sensitive. If he takes large amounts of alkalis and fat his ulcer symptoms are relieved, but he becomes asthmatic at night. By taking less alkalis regularly and sleeping on a kapok pillow he is free from both ulcer symptoms and asthma. Hyperchlorhydria is less common than hypochlorhydria in asthmatic adults, and in this patient as far as his sensitivity was concerned was somewhat of a protective nature, as when it was reduced by alkalinization, he was rendered more sensitive to an air-borne irritant.

The fourth manner in which dietary indiscretions may initiate asthmatic attacks is a reflex one. The stomach and upper intestinal tract are supplied by the vagus nerve, and gastric distension may irritate the vagus and so set up bronchial spasm. The gastric distension may occur not only from large amounts of food but also from flatulence from which such a large proportion of these patients suffer.

Further, asthmatic attacks are quite commonly looked upon as the result of nasal abnormalities, and a series of operations undertaken without any permanent relief. Most recent observers regard nasal abnormalities as merely coincidental or directly secondary to nasal allergic manifestations. The œdema resulting from numerous repeated reactions, especially if the irritant is an air-borne one, finally produces hyperplasia of the lining mucosa of the turbinals and sinuses by interfering with the blood supply and drainage. The ostia close, and so the sinuses may become fertile fields for bacterial invasion and growth. Once infected we have a damaged organ that is more likely to react to the specific allergen; in other words a sensitive area is produced. If the irritation is continued long enough a chronic œdema and polypoid degeneration may occur, and the enlarged tissues or bony deformities then press on a certain area of the nose and produce reflex bronchospasm which may then initiate attacks in the absence of the specific allergen. From these facts we deduce that the treatment of a case of allergy with local nasal pathology should be conservative and non-surgical along allergic lines until as good results as possible are obtained. After the subsidence of the œdema if the nasal pathology is still deterrent to adequate relief nasal surgery may be attempted. Nasal treatment should aim at freeing the nose from any source of infection, ensuring proper drainage and a free airway, as well as searching for any sensitive areas and removing tissue that may be responsible for reflex pressure symptoms. But one must remember that the primary factor is the allergic one.

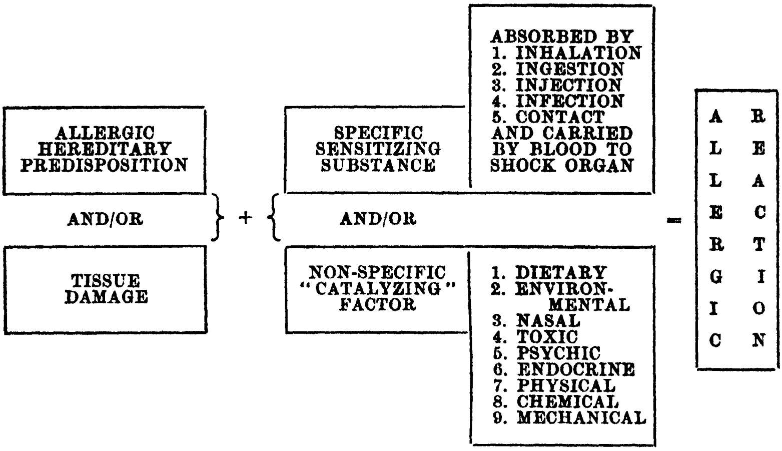
Prolonged fears and emotions in various forms may precipitate allergic responses by disturbing the vago-sympathetic balance or decreasing the normal secretion of adrenaline. Sudden emotions may have the opposite effect of stopping reactions acting through a similar mechanism. Nowadays, most available evidence suggests that these psychic states can only provoke allergic responses in persons who are already allergic. Most of the cases reported similar to that of the picture of the hay-field or the artificial rose provoking hay-fever occur only in people who are known to be sensitive to the real articles; it is impossible to give a normal person hay-fever by getting him to sniff an artificial rose or even a real one. In other words, as the result of his allergy the symptoms have become a conditioned reflex which, after repeated exposures, is capable of being fired off solely through nervous channels without the intervention of the specific sensitizing substance. When, as the result of desensitizing the patient against the primary cause of his reactions, he is shown that he can experience exposure to the original cause without reaction all the psychic elements disappear, and especially the factor of expectation, and the case is solely an allergic one. This statement is borne out by the fact that it is possible to prepare some serum from a sufferer and inject it into a normal person's skin. If this site is tested a local reaction will only occur with the specific substance to which the patient was hypersensitive; hence an anti-substance circulates in the sufferer's blood. This fact is difficult to explain solely on a psychopathic basis.

Endocrine dysplasias have in the past been looked upon as predisposing factors in allergic responses. Recent statistics, such as those of Witts (1934) and Gardiner Hill (1933), show that endocrine dysfunction is rare in definite cases of allergy, and that allergic responses are very rare amongst patients manifesting endocrine dysplasias. In spite of these figures we know that menstruation, marriage and the menopause play an important part in females—most allergic conditions being worst at the onset of the period—whilst during pregnancy there is a comparative freedom from symptoms. Estimations of the basal metabolic rate have shown that in most allergic conditions there is a tendency for the readings to be slightly subnormal. Allergic patients in general do not fall into any picture simulating increased or decreased function of any of the ductless glands so far studied. The recorded results of remarkable responses with endocrine therapy are isolated; for each case responding there are hundreds of cases in which no direct improvement can be determined.

Various infective conditions have been looked upon as etiological factors, the most frequent of which is tuberculosis. From statistical evidence, radiological evidence and tuberculin reactions it has been shown that only one asthmatic patient in a hundred gives any positive evidence of active tuberculosis; only one patient with active tuberculosis in two hundred suffers from true asthma; and when asthma does develop in a tuberculous subject the sensitizing agent is generally of an inhalant nature and the asthma is relieved by its removal or by a course of specific desensitizing injections. In the rare cases in which the sensitizing agent is bacterial in nature, it is more often a secondary invader than the tubercle bacillus. Hence tuberculin therapy is devoid of any specific reaction in cases of allergy even though they give positive tuberculin tests. Its effect is purely non-specific.

Numerous toxic processes have been incriminated, and focal infections of the teeth and bowel investigated. Bacteria isolated from the sputum are also commonly employed. Wilmer and Cobe (1933) employed vaccine therapy in 500 cases of bronchial asthma. They divided the cases into several groups, in one group using stock vaccines, in another autogenous vaccines containing (1) only the organisms which could be considered pathogenic, (2) all the organisms present, and (3) all pathogenic and normal inhabitants which gave positive skin reactions. Their figures showed that stock vaccines or autogenous vaccines have very little to recommend them unless they were regarded as effecting non-specific reactions. One type of bacterium is of importance. I refer to the Gram-negative organisms of the sputum which Knott (1933) has studied. They appear with equal frequency in bronchitic infections of all types regardless of whether the patient is asthmatic or not. By their growth they produce histamine-like substances, and so, in asthmatics, they represent a secondary infection capable of increasing bronchiolar constriction. From his investigations Knott concluded that Gram-negative bacteria or their products can only produce definite clinical asthma in those people whose bronchi are already in a state in which slight further stimulation will produce bronchospasm. Regarding bacteria and their products there is no definite proof that a true allergic reaction occurs from sensitization to their proteins. The only methods known at the moment by which they produce their effects are by the local production of histamine in the lungs of a sensitive patient, and by the local or general lowering of the resistance of the body to some specific allergen by the infection. In either case the removal of the specific allergen is much more likely to lead to success in treatment than is any vaccine treatment.

From the foregoing remarks it will be seen that the factors concerned in the production of the allergic response may be divided into four groups, two related to the onset of sensitization—the allergic hereditary predisposition and/or tissue trauma, and two related to the production of the individual attack—the specific sensitization and some non-specific catalyzing factor. These factors may be set out diagrammatically as follows :—



Illustrating the main factors concerned in the production of an allergic reaction.

If this diagram be kept in mind in taking the history of individual cases the somewhat bewildering statements of the patient may be placed in their true categories and a rational method of treatment undertaken.

The multitudinous forms of therapy that have been devised may be grouped into six categories :—(1) avoidance or removal of the specific cause; (2) avoidance or removal of contributory factors; (3) desensitization, specific and non-specific; (4) symptomatic treatment by drugs or surgery; (5) physical therapy; (6) remedial exercises.

Avoidance or removal of the specific cause.—Theoretically this is the ideal method of treatment; it makes it necessary that the skin tests should be carried out with reliable extracts, and that the patient should avoid the foods, animal emanations, dusts or cosmetics to which positive reactions are obtained. A rubber mattress and kapok pillows should be substituted for horsehair, rabbit hair, feather or down bedding, and pets removed. Dust-holding surfaces should be minimal, and vacuum cleaning advised. Orris-root free cosmetics should be used by female patients; these can be obtained from Messrs. Boutalls, Ltd. By admitting the sufferer to a hospital or convalescent home, or by a change of climate or altitude a passive avoidance of these irritants is brought about, but the resulting benefit is temporary only. If the specific substance is conveyed in the outdoor air many mechanical apparatus have been designed to afford relief at home, such as air-filters or masks; but the movements and interests of the individual are necessarily restricted.

Avoidance or removal of contributory factors.—This group includes :—(*a*) Attention to the general hygiene of the home and the patient—the ventilation and cleaning of the home, the use of morning rather than evening baths, the wearing of cellular underwear rather than thick woollens, and the cultivation of an outdoor life. (*b*) Attention to diet and the digestive functions—the taking of small, easily digested meals, the principal meal being at noon and the supper light, and the avoidance of food or beverage at bedtime; due attention to flatulent dyspepsia or chronic gastritis by gastric lavage or hydrochloric acid therapy; and the treatment of constipation by morning salines rather than aperients taken over night. (*c*) The removal of foci of infection or reflex irritation, the common site of which is in the nose, nasal sinuses or throat. (*d*) The correction of any endocrine dysfunction. (*e*) The soothing of any disturbing psychopathic states.

Desensitization.—Desensitization is necessary in cases in which the specific cause cannot be removed, and the methods employed may be either specific or non-specific in nature. Specific desensitization may be brought about (*a*) by the ingestion of gradually increasing doses of a food, or by denaturizing the food to a large extent by the employment of heat or chemicals, or (*b*) by injection if of an inhalant nature. Patients are usually sensitive to more than one inhalant allergen if their symptoms have lasted for any length of time, and the common substances to which reactions are obtained are animal emanations, dust, orris root and pollens. The procedure that I employ is to prepare the strongest solution possible of the specific irritants, and to combine with it a quarter of its volume of adrenaline chloride solution (1/1,000). Increasing doses are given daily if in hospital, or once or twice a week if at home, for about 15 doses. The use of concentrated specific solutions and the prevention of immediate allergic reactions by buffering the solution with adrenaline produces in inhalant-sensitive cases better results than any other method of treatment.* Non-specific treatment of many types has been suggested, of which one may mention peptone, tuberculin, milk, vaccines, "proteose," auto-hæmo-therapy, auto-sero-therapy and liver therapy. The percentage of good results from treatment varies very little whichever form is used, but some are more convenient than others. They should have very little place in future treatment in specific cases now that potent extracts can be employed as the result of reliable skin reactions, but in cases that cannot be skin tested and the cause determined they must still find a place in treatment. Even in these cases I feel that a mixture of the common inhalant allergens is likely to prove of more benefit than a non-specific agent.

Symptomatic treatment.—Among the drugs used iodides, atropine, belladonna and stramonium still hold their place. Aspirin brings great relief in some cases and induces attacks in others. Glucose and hydrochloric acid help in most of the allergic states, and for people who cannot take the acid in solution aklorep tablets (Messrs. Roberts & Co.) may be employed. Calcium is not of any value. The surgical treatments advocated include bronchoscopy and various forms of neurectomy and should prove a last resort only.

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* Solutions of the common British pollens causing hay-fever can now be obtained from Messrs. Duncan, Flockhart & Co., and better results in treatment follow a mixed solution containing all the pollens of the district to which the patient reacts than can be expected from the use of a single pollen such as that of timothy grass.

Physical therapy. — Physico-therapeutic methods include electro-therapy, actino-therapy and X-ray therapy, which may produce some non-specific effects but cannot be relied upon. Since the observation that most allergic conditions subside during feverish states, recent observers have employed various forms of pyrogenic therapy. At the moment it may be stated that the results of spontaneous fevers are far more efficacious in relieving allergic conditions than any artificially induced fever whether brought about by a fixation abscess, during non-specific therapy, during hot baths, or by the use of the high-frequency current.

Remedial exercises.—These are necessary in all cases of asthma in which the attacks follow each other so rapidly that the over-expanded lungs do not have an opportunity to return to their normal size, and in consequence of which the thorax assumes a characteristic barrel-shape. They should be more of an expiratory than an inspiratory nature, and a definite series of respiratory exercises is carried out at the clinics of Great Ormond Street, Guy's and King's College Hospitals.

With regard to treatment, if we realize that there are two factors concerned in the initiation of attacks, one a specific sensitization and the other a group of non-specific non-allergenic triggers, we can conceive that the removal of either group may result in ensuring a period of freedom from attacks. So the allergist, the rhinologist and the dietitian may all be right in their line of therapy, but of these factors the allergic is the most constant, potent and frequent, and the best therapeutic results must ensue when all work in harmony.

References

References to recent work are contained in the author's " Recent Advances in Allergy." London, J. & A. Churchill, 2nd edition, 1934.

RECENT ADVANCES IN THE TREATMENT OF ACUTE INFECTIOUS DISEASES

By WILLIAM GUNN, M.A., M.B., M.R.C.P., D.P.H.
Deputy Medical Superintendent, Infectious Diseases Service, London County Council.

THE general practitioner usually sees infectious diseases as they affect individuals or small groups of individuals and is not immediately concerned with the specific immunity index of the community or with the apparent vagaries of epidemic or seasonal prevalences of this or that disease. It is the duty of appropriate health authorities to make provision for the domiciliary care and hospital treatment of acutely ill patients whose economic or hygienic circumstances forbid home nursing. These authorities are enabled to anticipate the demands upon their accommodation, with an accuracy almost amounting to mathematical precision, by a study of previous epidemiological happenings. Official medical opinion has assumed that the policy of providing hospital accommodation is the best method of combating the menace of infectious disease, but has found it difficult to present strictly comparable figures leading to formal proof of the validity of the assumption. It is freely admitted that mere isolation measures have failed signally either to reduce appreciably the incidence of infectious diseases or to diminish their severity, and the term "isolation" hospital has become a misnomer. The only justification for its continued existence must be that its nursing and therapeutic resources are superior to those available in the home. It is not enough that they are slightly better; to balance the financial outlay of public money and the domestic distress that removal to hospital frequently entails they must needs be demonstrably and appreciably better.

In the past, fever hospitals have had rather an unenviable reputation in the matter of "cross-infections" which in recent years has been largely undeserved. It has long been observed that outbreaks of such diseases as measles and whooping cough in the open wards almost invariably occur near the end of the normal incubation period, suggesting that the infection took place during transfer to hospital or shortly before it. Ambulances were naturally regarded with suspicion, as chicken-pox, notoriously an elusive infection, was the most frequent offender. Closer investigation of each case has shown that infection frequently takes place in the waiting-rooms of practitioners and in the large waiting-halls of general hospitals, where parents and children forgather for hours over afternoon tea, affording every chance of close contact and interchange of infection. If the staffs of fever hospitals were informed of such contact, appropriate isolation measures could be adopted, but such information is rarely vouchsafed. With the provision of more isolation accommodation in the fever hospitals and the general adoption of barrier or bed-isolation systems of nursing, the number of blameworthy cross-infections is being reduced to a minimum. Moreover this "aseptic" technique is being extended to embrace all diseases, as it is now realized that most complications are as readily transmissible as the primary disease, and concurrent infections, such as coryza and influenza, constitute a serious menace when introduced into a hospital ward. So that hospital staffs may be rendered guiltless of transmitting infection by their persons, they are immunized not only against small-pox, typhoid, scarlatina and diphtheria, but also against tonsillitis, common cold and influenza, or appropriate surgical measures carried out, whenever a tendency to these infections is present. It has been found more practicable to attack the problem of the temporary or contact carrier by these measures rather than by using a mask, which enjoyed a short vogue during the late war.

In the present article it is proposed to deal with the therapeutic aspects of six acute infectious diseases, namely, diphtheria, scarlet fever, measles, whooping cough, cerebrospinal fever and acute poliomyelitis. They are the commonest or most deadly infectious diseases prevalent in this country at present and, by a happy chance, in respect of all of them, important advances in therapeutics can be reported.

DIPHTHERIA

Diphtheria is commonly pointed out as the classical lethal disease in which serum therapy finds its most brilliant application. It is still widely believed that practically every patient with faucial diphtheria can be saved from death by administration of appropriate doses of antitoxin, and that the present mortality-rate of 4 to 6 per cent. is almost entirely due to the laryngeal form of the disease. Nothing could be further from the truth. Nearly all diphtheria fatalities follow toxic, late or neglected faucial infections. Not all severe cases are late, nor are late cases necessarily severe; it is not rare to see a relatively early case—second or third day—in which membrane continues to spread in spite of huge doses of serum, even given intravenously. An unusually high incidence of toxic diphtheria, resisting the action of antitoxin, with a mortality-rate of 8 to 10 per cent., has been reported in recent years in Leeds by Anderson and MacLeod. These investigations led to the conclusion that these severe attacks were attributable to distinct highly toxigenic and invasive strains, designated "gravis," with different serological and fermentative characters from the more usual "mitis" strains, and suggested that a specific antitoxin prepared from them would be necessary for their complete neutralization. Such a specific serum has since been made and put on clinical trial, but the results so far do not disprove the unitarian doctrine of the constitution of diphtherial toxin. More recently, " gravis " strains have appeared in the Manchester and London areas, coincident with the appearance of a more severe type of diphtheria, but investigations have failed to disclose any constant quantitative or qualitative differences in the toxin they produce compared with " mitis " strains. Nevertheless, some such hypothesis would appear necessary to explain the unequal therapeutic effect of serum of proved antitoxic potency. Probably the cure of diphtheria is not a mere matter of toxin-neutralization, as we invariably inject far more antitoxin than is theoretically necessary to neutralize the circulating toxin even in the severest clinical attack, and, exceptionally, membrane continues to spread for some hours or days after adequate doses of serum, even given intravenously. It has been shown by animal experiments and by determination of the toxin content of the serum of patients that only small amounts of toxin are present in the blood of individuals even when dying of diphtherial toxæmia; as soon as it is formed the toxin immediately attaches itself to various tissue cells in a firm combination. It is highly probable that only recently formed linkages can be broken and only by a marked excess of circulating antitoxin. It follows that by serum alone we can only prevent further damage; we cannot hope to undo the harm already done.

In recent years, various modifications of the customary methods of serum administration have been introduced, especially for very severe attacks. Instead of daily injection of 20,000 to 30,000 units intramuscularly until the membrane has disappeared, the serum is now usually given in a single large dose intravenously, thereby securing the highest concentration of antitoxin in the shortest time. For the severest attacks, 20,000 to 30,000 units are given intramuscularly and half an hour later 50,000 to 80,000 units intravenously, without dilution of serum. It is probable that little advantage is gained by giving more than 100,000 units, although 400,000 to 500,000 units have been given, apparently with benefit. A serious objection to the intravenous route is the not infrequent occurrence of severe "shock" reactions which, unfortunately, are most common and most alarming in toxic attacks and may accelerate, or very occasionally determine, the fatal issue. The ingestion of 20 to 30 grams of glucose, and the administration of ½ to 1 c.cm. adrenaline, before or with the serum, tends to ward off severe reactions, but not invariably.

A word on local treatment may be permitted even at this late day. In the pre-serum era, and even at the present time in certain quarters, powerful caustic and irritant germicides have been freely and repeatedly applied in the vain hope of destroying the enemy at the site of its activities. Almost certainly these heroic methods did more harm than good by damaging the inflamed tissues and depressing the resistance of the surrounding mucosa and so facilitating further extension of membrane. Usually no local treatment is necessary, but, where marked angina, from associated streptococcal infection, is present, the fauces may with advantage be gently syringed with alkaline or weak potassium chlorate solution.

The uncertain action of antitoxin in the severest attacks has directed the attention of clinicians to various auxiliary or supportive measures. The most promising of these in recent years has been the use of glucose and insulin for the assumed beneficial action of excess of circulating carbohydrate on the cardiac musculature. It has been demonstrated beyond cavil that the carbohydrate metabolism equilibrium is invariably upset in severe diphtheria, but it has not so far been satisfactorily proved that the efforts to stabilize the metabolic processes by glucose-insulin administration result in increase of nutriment and energy to dead or dying muscle cells, or even to those relatively unharmed by the toxin. While the degree of upset is directly proportional to the degree of toxæmia, and furnishes the most delicate criterion available regarding the ultimate prognosis, it is almost certain that it is not specific to diphtherial intoxication, but is, in fact, a manifestation of circulatory failure from whatever cause.

The published results of Schwentker and Noel and of Benn and his colleagues were suggestive and have stimulated further investigations into the various problems connected with carbohydrate utilization in acute toxæmia, but their omission to use the treatment for alternate cases seriously lowers the value of their work. The recent experience at Leeds, where the fatality has varied as much as double or treble the usual level, illustrates the danger of using as a control group cases taken from a previous epidemic.

Adrenaline continues to be used by some workers, even by mouth, in order to make good a supposed adrenaline deficiency resulting from suprarenal destruction. Recent investigation has shown that there is no adrenaline lack in diphtherial toxæmia, and any good action it possesses is only temporary, and may be followed by dangerous cardio-vascular depression.

The researches of the late Professor Dixon have thrown a welcome light on the significance of the uncertain action of digitalis in acute toxæmias. He was able to show by animal experiments that complete digitalization protects the cardio-vascular system against the action of diphtherial toxin, and that the measure of its protection is determined by the speed and completeness with which digitalization is effected. For an adult, one drachm of a fresh tincture, standardized to contain one international unit of activity per one c.cm., is given every six hours, day and night, for four doses. On the second day ½ drachm is given six hourly for four doses, when digitalization is usually complete. In the absence of signs of intolerance, and if the pulse rate has not been brought to within normal limits, $\frac{1}{2}$ drachm doses are continued six-hourly with a careful watch on the effect of each dose, until the patient is fully under the action of digitalis. It is inadvisable to give the drug at shorter intervals than six hours as that period is required for complete absorption of each dose. For children, Dilling's formula, $\frac{\text{age}}{20}$ adult dose, has been found most applicable although body-weight should be taken into account whenever the weight is outside the average limits. It has been found important to get the patient fully digitalized before the diphtheritic myocarditis has advanced sufficiently far to cause cardiac failure, as the signs of intolerance and of diphtheritic intoxication are practically identical. While my own series of cases so treated is still too small to permit of an authoritative statement on the value of the method, the results have been sufficiently encouraging to apply it on a larger scale. The electrocardiograph has given invaluable assistance in checking the results of glucose-insulin therapy, and it is believed that it will similarly assist in controlling the effect of digitalis therapy.

The application of endoscopic methods in the treatment of laryngeal diphtheria has opened up a new field, whereby more accurate diagnosis is rendered possible by direct inspection of the parts and examination of smears and swabs, and aspiration of membrane or mucus through special tubes introduced into the larynx by means of a laryngoscope, may be practised with ease and safety. In older children, in whom obstruction is usually due to membrane formation and not to spasm, instantaneous and lasting relief is commonly afforded at one operation, but in young children repeated aspirations are often required and intubation or tracheotomy may subsequently be necessary. The endoscopic method, moreover, permits of the introduction of an intubation tube by visual guidance, thus reducing the risk of trauma and subsequent development of stenosis. In the best pattern, the patient is able to breathe freely while the tube is being introduced, making the operation free from risk even in inexpert hands.

In the past, an appreciable number of patients who survived cardio-vascular damage developed later various complications, of which diaphragmatic paralysis is the most dreaded, and to which they eventually succumbed. Since the introduction of the Drinker respirator a fair number of cases of post-diphtheritic respiratory failure have been treated with success in America and in London. Not all cases are saved, however, as occasionally cardiac failure of bulbar origin supervenes with fatal results, although the respiratory movements have been successfully maintained. If this complication is averted, complete recovery of the phrenic and intercostal nerves follows, as is the rule in post-diphtheritic neuritis.

Elimination of diphtheria organisms from the fauces and nasopharynx is generally rapid—in one to three weeks—in healthy individuals. Where there is hypertrophy of the tonsils or adenoids, or abnormality of the nasal passages, the carrier state is liable to follow, unless appropriate surgical measures are carried out. Much has been written on the phenomenon of intermittency in the diphtheria carrier, but many of the theories as to its causation and continuance are hardly supported by the facts. Segregated in a cubicle, or treated on fresh-air lines, the carrier rapidly clears up, but if he remains in his infected surroundings the condition persists; in short, the convalescent carrier is usually a product of his environment.

SCARLET FEVER

Despite the general mild character of scarlet fever in recent years, it is probably advisable to send cases to hospital for isolation and treatment unless the home conditions are particularly favourable. Despite its infectiousness, removal of the patient usually averts the occurrence of further cases, especially if infection took place outside the family circle. Meantime, the household contacts may conveniently be Dick-tested and active immunization of susceptibles carried out.

Apart from general and symptomatic measures directed to alleviating the local angina, the treatment of scarlet fever is summed up in the one word serum. Its action in abolishing the early toxæmia and in averting the tendency to serious complications is as dramatic as that of anti-diphtheritic serum in diphtheria, but it appears to have little effect in checking the invasive and pyogenic activities of the hæmolytic streptococcus. It is probable that some samples of serum do possess anti-bacterial properties in addition to the antitoxic action, and may tend to destroy the micro-organisms by assisting the defence mechanism of the body, but this latter action is very inconstant; hence its failure in erysipelas, cellulitis, puerperal fever and septicæmia. It was hoped at one time that highly specific sera based on Griffith's four serological types would improve the therapeutic outlook, but this hope has not materialized in actual practice.

Mild cases of scarlet fever do not require serum; in these an uncomplicated course is the rule when the nursing and hygienic conditions are satisfactory. A fair proportion of mild cases do not develop a complete immunity, as shown by the persistence of the positive Dick reaction. It has been found to be sound practice to inject increasing doses of scarlatinal toxin or toxoid into those who have not become immune in two to three weeks in order to confer a solid immunity and prevent the possibility of relapses or second attacks.

For attacks of moderate severity administration of serum is always advised, as it appreciably curtails the initial toxæmia and reduces the number and severity of complications. The sooner serum is given the more constant and clear-cut are the therapeutic effects but definite benefit can be obtained from serum given as late as seven to ten days after the onset. Doses from 10 to 50 c.cm. are given according to age, severity of attack, and day of disease, usually by the intramuscular route.

When the infection is obviously severe from the outset, or when the clinical condition has definitely got worse, serum should be injected intravenously, in doses varying from 20 to 100 c.cm. More rapid improvement may confidently be expected to ensue as compared with a similar dose given intramuscularly, but the therapeutic limitations of scarlet fever antitoxin are not infrequently evident in septic cases, whatever route be employed, and many observers consider that the shock and collapse which may follow intravenous therapy is more harmful to the patient than the slight delay in using the intramuscular route.

In the healthy individual, and in the absence of septic complications, the hæmolytic streptococcus rapidly disppears from the fauces and nasal passages —usually in 7 to 21 days—or are so diminished in numbers that their presence is harmless. It has been assumed by many workers that the infectivity and virulence of the micro-organism are reduced during convalescence, but no definite proof of this assumption has yet been brought forward.

The same conditions conduce to the carrier state in scarlet fever as in diphtheria and the same measures should be adopted for their prevention. Persistent nasal carriers may with advantage be treated with alkaline nasal douches and with dimol snuff, which appears to have a pronounced germicidal action on both micro-organisms.

MEASLES

In any scheme of measles control account must be taken of certain basic factors, such as the high infectiousness of the disease, the low viability of the virus, the almost entire absence of immunity towards the end of the first year of life in the absence of clinical attack, and the important bearing on the prognosis, in a given case, of physical condition, nutrition and environment. Efforts to provide a sheltered existence, free from contact with measles, are therefore doomed to failure in overcrowded areas, and opinion has been veering to the view that bio-prophylactic measures, especially attenuation of attack, is the ideal aim and should always be practised whenever possible. Even in the wards of fever hospitals, where life is frequently in danger from the primary disease, attenuation may be practised with confidence, provided that the conditions requisite for success are observed. This is a fortunate circumstance, as adult-measles serum, which is always readily obtainable, is, in appropriate doses, quite as effective for attenuation as convalescent, although when complete protection is desired, the latter remains the more reliable agent. During the next measles epidemic, no child known to have been exposed to measles need be denied the boon of serum therapy. Even should the demand exceed the supply at the height of an epidemic, practitioners could obtain the necessary equipment, a paraffin-treated sterilized syringe of 50 c.cm. capacity, with which to inject parental immune blood into susceptible contacts in the family circle.

A minimum dose of 10 c.cm. adult serum, given intramuscularly, is recommended; from the age of three years and onwards the dose is reckoned in c.cm. by multiplying the age in years by four but it is never necessary to give more than 50 c.cm., even to an adult. When the above doses are given in the first three days after exposure, complete protection is the rule, but, if given later in the incubation period, a modified attack is the more probable event, the later the injection the less the degree of modification. Smaller doses, even one half the above, with consequent economy of serum, may be given in the first three days, when attenuation is desired. If convalescent serum is employed, one half the above doses is sufficient, both for protection and attenuation, while of adult blood twice as much or even more is needed.

Despite every effort to confer either protection or attenuation, a certain proportion of susceptibles, which will probably remain high if deliberate exposure is not practised, will continue to be infected unknown to parents or guardians, and, in these, attacks of normal severity may be expected. Unfortunately, when measles has fully developed even a considerable dose, 20 to 30 c.cm. of serum does not exert any demonstrable therapeutic effect when the intramuscular route is employed. During the recent epidemic I have given both adult and convalescent serums intravenously in the early stages of severe attacks. The results were encouraging but not dramatic. Possibly after the 6th or 7th day of the disease little therapeutic benefit is to be expected, as at this stage the patient is virus-immune, although still in a highly susceptible state as regards invasion by secondary organisms, such as the hæmolytic streptococcus, pneumococcus and Pfeiffer's bacillus.

The pioneer work of Griffith and Glover has shown how streptococcal tonsillo-pharyngitis infections spread through the healthy populations of our public schools, chiefly in the dormitories, leaving in their train such serious complications as otitis, articular rheumatism, and endocarditis. They were able, by means of the serological method of identification of streptococci, to trace the infection from one member to another, with great accuracy. In like manner, streptococcal complications, including pneumonia, can be shown to invade a measles population in an open ward with wildfire rapidity, as the mucous membranes of the patients are in a highly vulnerable state from the virus onslaught. Overcrowding, whether in the home, school sick-room, or hospital ward, is admittedly the commonest cause of a high incidence of streptococcal and other bacterial complications. If it is permitted, no nursing technique, however conscientiously carried out, can prevent the transmission of infective material from patient to patient. The ideal arrangement from the nursing standpoint is the single chamber or glass cubicle method, but it has several disadvantages. Apart from the high capital outlay and cost of running such units, the psychological effect of complete separation on young children and on their parents, may be detrimental, especially if the period of detention is prolonged. The substitution of small wards of two to four beds each minimizes the risk of cross-infection, and largely dispels the feeling of confinement, but these are also costly to run. Such a system is impracticable for nursing measles on the scale of present-day epidemics in London and other large centres of population. The only solution is to nurse measles patients in the early stages—the first 10 to 14 days—in open wards on bed-isolation lines. Uncomplicated cases are thereafter transferred to convalescent hospitals in the country or at the seaside for a period of two to four weeks, or longer in special instances.

Should pneumonia supervene, open-air treatment on a balcony is advised. In the presence of anoxæmic cyanosis oxygen must be freely administered. The older funnel and nasal catheter methods are wasteful, ineffective, and frequently distressing to the patient. By means of the oxygen tent, such as that devised by Dr. E. P. Poulton, which I have used in a number of cases, cyanosis is readily abolished with the minimum of discomfort to the patient. In severe attacks of pneumonia some degree of pleurisy, with or without effusion, is the rule. Should pus form, aspiration is necessary, preferably by a closed continuous method, especially if the empyema is syn-pneumonic in type. To this end a No. 4 or 5 Jacques' rubber catheter is introduced into the pleural cavity by means of a hollow cannula and sealed with successive layers of gauze soaked in collodion and attached to a syphon system composed of a series of Woulfe's bottles.

Laryngitis in the early stages of measles is a common symptom, requiring no special treatment, as it usually subsides on, or shortly after, the appearance of the rash. Should the laryngeal symptoms increase, diphtheria antitoxin must be injected forthwith, without waiting for the results of cultural examination. A direct smear is frequently equivocal and may mislead. The steam-tent is not employed nowadays, especially if there is any tendency to pneumonia, but some authorities still use the steam-jet in the hope of relieving the laryngeal spasm. If the cultures are negative for diphtheria, but show the presence of hæmolytic streptococci, an injection of scarlet-fever antitoxin is recommended. Suction is only profitable when membrane or exudate is present, and intubation or tracheotomy is frequently required in really serious cases. On account of the special liability to ulceration in streptococcal invasions tracheotomy is the operation of choice, but intubation may be practised with safety in purely diphtheritic cases.

It seems unnecessary to enumerate the numerous so-called measles " specifics "; there is but one specific of proved value, immune measles serum, and its scope in treatment is somewhat limited, as already indicated.

WHOOPING COUGH

The number of drugs advocated in the treatment of whooping cough must be legion and bear eloquent testimony to their general inefficacy. Too often the medical practitioner pins his faith on proprietary preparations of complex or obscure constitution on the very doubtful evidence of one or two apparent successes. A critical attitude is more easily maintained in hospital practice, where certain elementary but essential precautions regarding control experiments may be observed. When subjected to clinical trial, according to the accepted rules of statistical research, none of the so-called specific remedies for whooping cough, such as atropine, benzyl benzoate, intramuscular ether, ephedrine, intramuscular calcium, alkalis or parathormone, or operative measures such as repeated lumbar puncture or injection of the superior laryngeal nerve with alcohol, has been shown to reduce the number and severity of the paroxysms or to exert a favourable influence on the course of the disease. In this knowledge, many practitioners rely on expectorant and stimulating mixtures, usually containing belladonna, ipecacuanha and ammonium carbonate. I mention them only to condemn, as they are usually unreliable and frequently harmful in upsetting the gastric functions which are characteristically unstable in this disease. Good nursing, abundance of fresh air, nourishing food adequate in vitamins A and D, given regularly with reference to the expected times of vomiting, are the chief points. Drugs are of secondary importance and should only be used when special symptoms call for them; for nervous or neuropathic subjects, in whom whooping cough is characteristically severe, luminal and bromides are the most effective. Probably no system of treatment has bettered that embodied in Osler's dictum, "Six weeks and a bottle of paregoric."

I have used pooled whooping-cough serum obtained from recent convalescents, both for prophylactic and curative purposes. In prevention, the results were encouraging, but no constant therapeutic effects were noted from administration of even large amounts of immune serum.

Multivalent vaccines prepared from Bordet-Gengou organisms have been used in the treatment of whooping cough, both in the early stages and in the fully established condition, but the recorded results have been far from encouraging; in the presence of serious complications such as pneumonia, their use is definitely contra-indicated.

Even when given shortly after exposure, or early in the incubation period, no constant mitigating effects have been observed. It is therefore necessary to fall back on its prophylactic use. Bacteriological opinion is united that only multivalent vaccines, prepared from freshly isolated strains in the correct antigenic phase, should be employed, but is still divided on the questions of the dosage and the optimum times of administration. The most convincing results have followed large weekly inoculations, given three to four months before the expected epidemic, and a shorter course later, when the disease is prevalent. A mild febrile reaction from a few of the inoculations is probably an advantage, leading quickly to tolerance to enormous doses. Subsequent exposure to a whooping-cough patient would appear to be safe, and may be profitable in converting a transient immunity into a solid and lasting one. In the absence of such a stimulus probably immunity only lasts one to two years, and a further course may be necessary before the next epidemic.

Whooping-cough patients should be nursed on bed isolation lines as advocated for the other acute infectious diseases, but a large ward should not be employed. The onset of a paroxysm of coughing in one patient is usually the signal for the majority in the ward to do likewise, provoking vomiting and rendering individual attention at the same moment a physical impossibility for the nursing staff. Not more than four or six patients should occupy the same ward; certainly never more than ten.

It is almost certain that patients are kept in bed and in the town hospitals longer than need be. As soon as the catarrhal symptoms have subsided and the risk of pneumonia is averted, they should be transferred to the country or seaside hospitals for prolonged convalescence. This is even more important in whooping cough than in measles on account of the greater liability to chronic pulmonary catarrh and tuberculosis.

CEREBROSPINAL FEVER

It is an old observation that epidemics, even small outbreaks, of cerebrospinal fever, are usually accompanied by an increase of severity, while sporadic cases are milder in type. The first crop of cases usually shows a high mortality, but as the epidemic progresses, either severity diminishes or more specific treatment is available, resulting in a much lower death-rate. Recent improvements in the preparation of serum, the more intensive serum dosage, and greater use of the available routes of administration have combined to improve the outlook in this deadly disease. It appears important that the strains used for serum preparation should be indigenous to the locality, freshly isolated, and constantly renewed. Greater therapeutic benefit is obtained when the antigen consists of living organisms instead of suspensions of killed organisms. Also, small doses over prolonged periods preferably are injected into horses as thereby the lytic action of the serum is enhanced. The usual method of giving enormous doses gives a serum of high agglutinating titre but the lytic properties are thereby seriously reduced. Moreover, the lytic activity of serum is rapidly lost with age; serum over six months of age should be discarded.

It is probable that the better prognosis in adults as compared with young children is due mainly to the fact that the disease is recognized at an earlier stage in the former, and not to any differences in the type of infecting organism, site of invasion, or degree of basal resistance. The sooner the patient comes under treatment the better the results, is more true of cerebrospinal fever than of any other disease. The older method of giving relatively small doses of serum over a prolonged period is now abandoned. Immediate intensive serum thereapy, concentrated upon the focus of infection, should be the aim. As soon as the condition is recognized, and confirmed by lumbar puncture, a dose of 10 to 25 c.cm. of serum is introduced intrathecally, and 50 to 100 c.cm. injected intravenously. If the septicæmic state is not improved in 12 to 18 hours, another intravenous dose is given, but a third is rarely necessary. Intrathecal injections are continued twice daily until clinical improvement is evident, but the progress should always be checked by daily examination of the cerebrospinal fluid. Until recently it was customary to use the lumbar route as a routine, and reserve cisternal puncture for those cases in which a block at the foramen magnum or at the base of the brain prevented free flow of cerebrospinal fluid. Injection of serum alternately by the lumbar and cisternal routes has given better results than by the former route alone which some authorities do not use after the initial diagnostic puncture. By this technique, serum is brought as quickly and closely as possible to the site of multiplication of organisms and of pus formation. If clinical improvement is not maintained, or purulent fluid charged with free meningococci persists after five to seven days of intensive serum therapy, or if signs of internal hydrocephalus develop, it is advisable to tap the lateral ventricles directly. The operation is a simple one requiring only superficial freezing as an anæsthetic, and a special drill (Purves Stewart's modification of Goetze's drill is suitable), by means of which a fine needle is inserted into the ventricular cavity and fluid withdrawn for examination and replaced with serum. The procedure appears free from risk and occasionally reverses the prognosis in apparently hopeless cases.

While multivalent stock serum is commonly employed in this county in the treatment of meningococcal meningitis, an opportunity has recently been given to test the value of Ferry's antitoxin, by the courtesy of Messrs. Parke, Davis & Co. In a personal communication, Dr. H. S. Banks, Medical Superintendent, Park Hospital, London County Council, reports that although his series of cases, 18 in all, is too small to warrant a decisive opinion, he has a definite clinical impression that Ferry's meningococcal antitoxin has a more potent therapeutic effect than a commercial brand of meningococcal serum which was employed on alternate cases during the same epidemic period. He also claims that a few patients who otherwise would have quickly succumbed, or passed into a chronic stage, were saved by the combined lumbar and cisternal routes.

ACUTE POLIOMYELITIS

Within the past decade or so, fresh hope has been raised that the menace of infantile paralysis may be averted by the timely administration of immune serum. While the disease has never attained epidemic proportions in this country, the occurrence of scattered cases, even in semi-isolated communities such as schools, suggests that the causal virus is widely disseminated in our midst. There is evidence on epidemiological grounds, and from investigation of the antiviral content of the " normal " serum of the population, that we have escaped major epidemics, not because we have evaded the organism, but because its universal distribution has conferred a solid immunity on the community. Nevertheless, the annual incidence of poliomyelitis in this country is sufficiently high to constitute a serious menace to the national well-being. Australian and American reports on the value of immune human poliomyelitis serum in the treatment of the pre-paralytic stage of the disease have been contradictory although encouraging on the whole. As long as poliomyelitis remains a sporadic disease it will be difficult to detect in the early stages, but, in the presence of a sequence of cases, the attention of practitioners is directed to its possibility. While clinical examination alone furnishes strong presumptive evidence of the disease in the majority of cases, examination of the cerebrospinal fluid permits of its confirmation beyond reasonable doubt. The fluid changes vary at different stages of the disease; early in the pre-paretic stage the polymorphonuclear cells are chiefly increased, but, as paralysis becomes imminent, the lymphocytes predominate. Globulin appears in the later phases of the pre-paretic stage and is usually greatest in amount after the paralysis has developed. The chloride and sugar contents are unaltered and the fluid is sterile.

Lumbar puncture should not be carried out until all the preparations have been made for examination of the cerebrospinal fluid at the bed-side, and immediate administration of serum, if the results of the examination confirm the clinical suspicions. 10 to 25 c.cm. serum is usually given intrathecally and the remainder of the full 50 c.cm. dose injected intravenously, cutting down upon the vein in young children if necessary. If the dose has been adequate, the temperature will have fallen and the toxæmia lessened in 18 to 24 hours, although rigidity may persist. If improvement is not manifest, a further 50 c.cm. is given intravenously, a total of 100 c.cm. being usually considered adequate.

For the past two years anti-poliomyelitis serum (convalescent human serum) has been available to practitioners in this country, on application to the Medical Research Council, which, in cooperation with the Lister Institute and the Public Health Department of the London County Council have formed a " poliomyelitis " committee in order to procure adequate supplies of blood, arrange for the preparation and distribution of serum, and collate the clinical data following administration of serum. As the supply is limited, albeit sufficient for present needs, the serum is intended to be used only in the pre-paretic stage of the infection, or where increasing toxæmia or progressive invasion of the spinal cord are present, as shown by extension of the paralysis. The serum is free from the untoward effects which may follow injection of horse serum and each batch is required to pass a given standard for antiviral potency at the Lister Institute before issue. Small stocks of serum in cartons, each containing 100 c.cm. of serum, have been distributed to certain London hospitals for emergency use, but the main stock has been deposited at the Western Hospital, Fulham, where early or suspected cases of poliomyelitis in the London area are admitted for observation and treatment, and whence supplies of serum are issued to hospitals, public health authorities, and practitioners in Great Britain, for use in appropriate cases. While the numbers treated with serum at the stage most conducive to success has so far been too small to permit of any conclusion regarding its efficacy, it is hoped that the present supplies will be utilized wherever practicable during the next seasonal prevalence of the disease.

It is agreed by all that serum by whatever route is useless in the post-febrile stage, when the infection has become quiescent and the paralysis is firmly established. Careful nursing is necessary to prevent dangerous complications, especially when the diaphragm and intercostal muscles are involved. In respiratory arrest the Drinker respirator is invaluable in saving life. Patients have been kept alive for weeks or months and have ultimately made a satisfactory recovery. The models manufactured in this country by Siebe Gorman & Co., London, are simple to operate and readily transportable, and have a wide range of application in various forms of respiratory failure.

RECENT ADVANCES IN THE TREATMENT OF TROPICAL DISEASES

By SIR LEONARD ROGERS, K.C.S.I., C.I.E., M.D., F.R.S.
Extra Physician, Hospital for Tropical Diseases; Lecturer on Tropical Diseases, London School of Medicine for Women.

IN no field has the modern science of chemiotherapy produced as great therapeutic advances as in tropical medicine, and especially in the cure of wide-spread protozoal diseases; this is largely due to the possibility of testing the numerous compounds made synthetically by the chemists on animals infected with the parasites of malaria in small birds, trypanosomes in rats, etc. Some of those which were found to be effective in such animal infections have proved to have curative value in the corresponding important human diseases. The following is the present position of some of the advances in this direction in the last decade or so.

MALARIA

The modern treatment of general paralysis of the insane by the artificial production of malaria has enabled carefully controlled experiments on prophylaxis and treatment of malaria to be carried out with important results. Thus the much disputed prophylactic value of quinine has been tested, and it has been shown that the administration of this drug for some days before mosquito infection with malaria does not prevent infection, but if it is continued daily for seven to ten days after the inoculation of the sporozoits into the human subject by infected mosquitoes, the development of clinical malaria is prevented by the curative action of the drug. Malarial fever produced by direct inoculation of infected human blood is more easily cured than that caused by mosquito infection. Moreover, benign tertian infections tend to die out in some patients with production of immunity after some months of artificial infection with the disease.

Of still greater importance is the establishment of the value of two new synthetic drugs by experimental treatment of bird malaria, confirmed subsequently in the human subject. The first of these is plasmochin or plasmoquine, a quinoline compound which has the remarkable property of destroying the crescents and other mosquito-infecting gametocytes, which quinine itself does not do; it is being used in small doses, such as 0·02 to 0·03 grammes daily in adults and 0·01 in children, in labour forces to remove the infectivity of their blood to the anopheles and so to act as a prophylactic measure in reducing the prevalence of malaria among them. In larger doses the drug is also curative in benign tertian, though not in malignant tertian, but it is too toxic in such doses to be safe except in hospital cases.

The other effective new drug is atebrin, which is non-toxic and active in all forms of malaria in doses totalling 0·3 grammes daily in one or more doses, 8 to 12 full doses being sufficient; relapses appear to be less frequent than after quinine, although the early hopes that they would be eliminated have not been fulfilled. This drug is also preferable to quinine in the treatment of the blackwater-fever complication of malaria, and it is tasteless.

TRYPANOSOMIASIS

Equally important are the advances in the treatment of the most deadly scourge of vast areas of tropical Africa, trypanosomiasis going on to the formerly invariably fatal later stage of sleeping sickness. The success in early cases of such arsenical preparations as atoxyl and soamin led to the production synthetically of innumerable arsenical compounds and their trial against human trypanosome infections of rats and other small animals, and thus resulted the discovery of Bayer 205 in 1900, still a secret German preparation, although Fourneau of Paris has revealed the complicated composition of his preparation 309, which appears to have the same physical and therapeutic properties. Shortly after this Louise Pearce and W. H. Brown, of the Rockefeller Institute, New York, discovered a still more effective preparation in tryparasamide, which has powerful curative action in all stages of the disease, including the late sleeping sickness one, whereas Bayer 205 is active only in the early stages of blood infection before the invasion of the cerebrospinal system takes place. Both drugs cause rapid disappearance of very numerous trypanosomes from the blood of infected animals and of human subjects, although Bayer 205 appears to be the more effective in the first stage of the infection, and it is also of value as a prophylactic in those much exposed to infection. In early cases four to five weekly 1-gramme doses cure most cases. In the stages with cerebrospinal involvement Bayer 205 fails to reach all the trypanosomes, and tryparasamide must then be given, preferably, according to C. C. Chesterman's extensive experience, in the large doses in adults of 3·5 to 4 grammes, or 0·06 grammes per kilo, in a dilution of 1–40 intravenously at weekly or fortnightly intervals, or diluted further with an equal quantity of water intramuscularly, careful watch being kept for any visual disturbances which indicate temporary cessation of the treatment to avoid serious optic atrophy. In the South Sudan systematic search for and treatment of all sleeping sickness cases in camps has enabled the disease to be practically stamped out.

KALA-AZAR

The treatment of kala-azar has been greatly improved by the substitution of less toxic and more effective pentavalent antimony preparations discovered by chemiotherapy. A number of these have been carefully tested in the hospital of the Calcutta School of Tropical Medicine, and L. E. Napier has established that the best of them is neostibosan, or von Heyden 693, daily 0·2 to 0·3 gramme doses of which intravenously for ten days suffice to cure this formerly intractable and very fatal disease, with the result that the former case-mortality of 96 per cent. in the Assam epidemic form and of over 80 per cent. in the sporadic form of Bengal and other areas, has been reduced to under 10 per cent. Moreover, by systematic search for and treatment of all cases in some villages the yearly incidence has been reduced from 121 and 127 in the first two years to 8 and 3 respectively in the fifth and sixth years, so with a sufficient staff it could be eradicated.

AMŒBIASIS

This is yet another example of the discovery of further effective drugs in the last decade; although emetine retains its place as the most active one in rapidly clearing up the primary symptoms, though not infrequently followed by relapses, in the case of amœbic hepatitis it is now generally agreed that it is still the only reliable quickly acting remedy. The value, in addition to the proof of the greater safety and efficiency, in already formed amœbic liver abscesses, of a combination of aspiration and emetine in place of the old deadly open operation in tropical countries, is testified to by the fact that an average yearly death-rate of 98 from liver abscess in the British Army in India in the decade up to 1907, has been succeeded by the absence of a single death from this cause in three consecutive recent years. Recent search for methods of preventing relapses of amœbic dysentery after emetine treatment has led to the trial of a number of arsenical and other preparations, and Acton and Knowles in

Calcutta have found that the alkaloids of the old Indian remedy, kurchi bark from *Holarrhene antidysenterica,* is effective *in vitro* against the *E. histolytica,* but is too irritant intramuscularly, so Acton advises kurchi bismuth-iodide orally. The arsenical preparation stovarsol is also of value to supplement emetine and has a tonic action. An expensive drug, yatren, has been much advocated by German writers in both amœbic and bacillary dysentery without much scientific basis, and A. C. Reed in America, and others, have found it of little value; but recently the last named observer has found a new arsenical preparation, carbasone, to be less toxic and more effective than other arsenical drugs in bringing about lasting good results in amœbic dysentery. It is given in 0·25 gramme doses twice daily for ten days in gelatine capsules, or it can be administered as an enema containing 2 grammes in 200 c.cm. warm 1 per cent. sodium bicarbonate; toxic effects have not been observed.

CHOLERA AND SPRUE

In cholera no recent advances have been made in treatment, for bacteriophage has been found to be useless and, although it is claimed to have had a preventive action in Assam when added to drinking water, it failed in Bihar, so its value is not yet established.

In the other important bowel disease, sprue, a distinct advance has been made in the dietetic treatment, for though it has long been known that fats and much carbohydrate food were not well digested by sprue patients, Hamilton Fairley has worked out on these lines high protein diets of considerable value; the most convenient form is "sprulac," a powdered milk containing the required quantities of the various food principles, which only requires to be added to hot water to be ready for use. Further, the dangerous pernicious anæmia complication has been found to yield to liver treatment, preferable combined with iron.

LEPROSY

In leprosy the principle of injecting soluble products of the active fatty acids of chaulmoogra and hydnocarpus oils—introduced by L. Rogers in 1915 and reported by him in 1917 to be much more effectual in the early stages of the disease, which are seldom seen under a system of compulsory segregation—is now in general use by injection in all parts of the world, either as the original sodium salts, such as alepol, ethyl esters as used since 1919 on a large scale by Dean and Hollmann in Hawaii, and by others in the Philippines, or as creosoted pure hydnocarpus oil of Muir, which is the most economical plan. During the last few years Philippine observers have shown that the best result can be obtained by injecting ethyl esters directly into the skin lesions in drop doses in numerous places at one sitting. The improved treatment has led to a highly beneficial modification of rigid compulsion in a number of countries to enable early amenable cases to be attracted for treatment at out-patient clinics, and about 100,000 cases are being so dealt with at very slight cost yearly in India alone. In tropical Africa, with available land, the colony system to allow the patients to be largely self-supporting while under treatment, is proving very successful. Some of the gold preparations used in tuberculosis have been tried in leprosy with variable results, but krysolgan appears to be of value intravenously in eye complication as advised by W. H. Hoffman. By seeking out and treating early cases among the household contacts of known lepers it should be possible to prevent the large majority of new cases going on to an advanced infective stage, only a small number of which are curable, and as patients with advanced infection rarely live and retain their infectivity for more than ten years, the systematic use of this plan might soon reduce the remaining sources of infection to easily controllable proportions, and so in a decade or two render the task of nearly eradicating leprosy much simpler.

YAWS

In the widespread yaws of the tropics the salvarsan group of remedies retain their position, but owing to their cost being prohibitive in the scores of thousands of cases requiring treatment yearly in extensive areas of Africa, Oceana and elsewhere, the far cheaper bismuth preparations have proved of immense service, such as bismuth-tartrate of sodium and potassium in 0·2 gramme doses in freshly prepared boiled solutions intramuscularly at a cost of one-tenth of a penny per dose, or 6-grain doses of sodium bismuth-tartrate. Other bismuth preparations are under trial, but further evidence about them is required.

DIETETIC DISEASES

There has been more theoretical discussion on etiology than practical therapeutic progress during the last few years on beriberi and pellagra. It has been claimed that the latter is related to a deficiency of vitamin B_2, and Harriette Chick holds that the facts may best be explained on the hypothesis that some toxic substance derived from maize may be rendered harmless by the action of pellagra-preventive P–P factor, or vitamin B_2, in yeast, liver, milk and meat which are effective pellagra preventing foods.

HELMINTHIC DISEASES

No very outstanding discovery has been made in the last few years in the treatment of helminthic diseases, but useful work had been done on the detailed use of well established remedies with a few useful modifications. In hookworm disease a combination of safe doses of the two active remedies carbon tetrachloride and oil of chenopodium, or its active principle ascaridol, have proved to be best for use on a large scale; for example, a maximum dose of 2 c.cm. in adults of a mixture of 40 per cent. oil of chenopodium and 60 per cent. of carbon tetrachloride was given to 250,000 persons by H. R. O'Brien in Siam without a death due to the drugs. Recently tetrachlorethylene has been tried in Calcutta and found to be less toxic and safer in alcohol than carbon tetrachloride. It can be given in a 4 c.cm. dose with 1 c.cm. of oil of chenopodium well shaken up in two ounces of saturated magnesium sulphate at a cost of one halfpenny. In schistosomiasis tartar emetic intravenously, and emetine intramuscularly in young children with small veins, hold their own, and the newer pentavalent antimony preparations do not appear to present any advantages, and are much more expensive.

ULCERATIVE CONDITIONS

Tropical ulcerative conditions of various kinds remain to be mentioned. In *Oriental sore* due to *Leishmania tropica* tartar emetic and emetine hydrochloride are still commonly used, and another effective method is to inject around the margin of the sores two or three times weekly ¼ grain doses of berberine sulphate in 1 c.cm. sterile water. In the common sloughing *tropical ulcer* striking results have recently been reported in Uganda following the daily intravenous injections of 15 grains of calcium chloride in 10 c.cm. water in adults. In veld sore the discovery of diphtheria bacilli has led to the effective use of the serum. In *Climatic bubo* Hanschell has reported good results from protein shock produced by the intravenous injection every third day of from 100 to 500 millions of dead typhoid bacilli.

APPENDICITIS

BY SIR CRISP ENGLISH, K.C.M.G., F.R.C.S.
Consulting Surgeon, St. George's Hospital.

ADVANCE has taken place recently in several of the many aspects of appendicitis. The question of deferred operation in certain acute cases is becoming more defined; chronic appendicitis is more accurately diagnosed; that deceiving expression "appendix dyspepsia" is being abandoned; and lastly operation with its attendant details has been greatly simplified.

ACUTE APPENDICITIS

(1) *Cases seen within* 36 *hours of the onset of symptoms.*—It is universally agreed that these cases should be operated upon at the earliest moment. Statistics continue to appear proving the success of operations during the first 24 hours of acute attacks: recent figures come from America in an interesting paper by Frederick Hoffman.[1] Operations during this stage mean a very small risk for the patient, usually no drainage and a quick convalescence. It follows that if results are good with operation within 24 hours, they will be better still for operations which can be done within 12 or 18 hours. There is still room for definite reduction of the time interval between diagnosis and operation; this interval can only be shortened by prelaid plans on the part of the practitioner, so that hospital or nursing home, anæsthetist, and surgeon should all be available in the shortest time possible. The shortness of delay before an operation is commenced is a test of efficient organization; but the process should be free of that form of haste, so disturbing to the patient, visualized by that popular expression "rushing the patient to hospital."

(2) *Acute cases seen after* 36 *hours.*—All agree that in children operation should never be postponed; but much discussion has ranged over the question of

delay in adults seen after 36 or 48 hours. Opinions are still divided between immediate operation and delay. Those who advocate the latter course say that operation should be deferred for 12 hours or more, the patient being treated in the Fowler position, having water only by the mouth, and no purgatives or enemas being given: in many of the cases so treated, the attack soon shows signs of subsiding or localizing, and then the appendix may be removed seven to ten days after the temperature and pulse have become normal. If, however, after 12 hours of this treatment the local condition shows any sign of increasing, operation is performed at once. It is argued that in this group of cases, the risk of immediate operation is greater than that of delay. Many surgeons, however, keep firmly to the principle of immediate operation in all acute cases; statistics are produced to support both views and therefore do not help matters. It is obvious that the advice to delay in acute appendicitis must always be a serious matter; in any case the word "delay" used in the positive sense is a bad one; if the results of treatment are unsatisfactory, this word will naturally encourage blame and regrets. The broad policy in the treatment of acute appendicitis has for a long time been operation at the earliest possible time; this policy has been strongly advocated by the profession and generally speaking has been accepted by the public. As a direct result, a large proportion of acute cases are operated upon within 24 hours and the results have been most satisfactory; at the same time the cases of advancing peritonitis, which in the old days were so commonly seen in hospital, have steadily diminished in number. Undoubtedly, a large proportion of the mortality of appendicitis is attributable to delay; this is again emphasized by Hoffman's investigations in America. In Philadelphia a fresh intensive campaign has been inaugurated for the reduction of the fatality of appendicitis by shortening the interval between the onset of symptoms and the recourse to hospitals and by preventing the use of laxatives before the patient sees a doctor.

The doctrine of delay intended for a certain group only of cases may readily be misapplied, and clearly involves considerable danger that delay is encouraged both in the profession, and by the public who may readily believe that prompt action is not as urgent as has been taught. Safety still lies in teaching the public the dangers of delay and the importance of operation within 24 hours. The only rational plan is that as soon as a practitioner makes a diagnosis of acute appendicitis, he should call in a surgeon who alone should be responsible for any degree of delay; in view of the existing doubts, it must be left to the operator to decide in each individual case. The question resolves itself into a matter of judgment on all the information available; obviously there can be no hard and fast rules, the decision must be made according to the conditions found in each case.

Advanced cases of appendicitis present very considerable difficulties. J. M. Black has emphasized the fact that in general peritonitis death is not due to septicæmia but to absorption resulting from the intestinal obstruction of ileus, and suggests that the most necessary part of the treatment of peritonitis is to prevent or relieve intestinal obstruction. Now it has been noticed that in cases of gangrenous appendicitis the development of a fæcal fistula is, rather unexpectedly, a favourable sign; severe cases which develop fistulæ have a definitely lower mortality than those which do not: in short, recovery from general peritonitis depends mainly upon whether the bowel can be emptied or not. For this reason, E. R. Easton and W. J. Watson advise a primary cæcostomy or enterostomy for cases in which the intestine is distended with a dull lustreless peritoneal coat and adhesions between the coils, signs which point to impending ileus or diffusing peritonitis;

a No. 20 (French) catheter is passed into the cæcum, guided through the ileo-cæcal valve into the ileum and fixed into the cæcal wall with purse-string sutures. This step is said to forestall ileus and to save many cases which would otherwise end fatally. They believe that a primary drainage of the bowel is so much more life-saving than a secondary drainage after the onset of symptoms of ileus that its performance should be considered in every complicated case of appendicitis.

On similar principles, for cases in which toxic developments are likely, *B. welchii* serum should be given at once and is likely to do far more good than if withheld until complications become obvious. One other point: bile enemas appear to be much more effectual than any other form of enema and should be used at once in these cases without trying the less effectual varieties. Black, in summarizing his interesting paper, says: "In the treatment of general peritonitis success has been obtained from the use of (1) operative measures, namely, enterostomy; (2) *B. welchii* antitoxin injections, and (3) bile enemas."

CHRONIC APPENDICITIS

It simplifies matters considerably if cases of recurrent slight attacks, cases of appendicular colic, cases of dyspepsia attributed to the appendix, or of the mild toxæmia so often the leading feature, are all grouped under the one heading of chronic appendicitis.

Doubt is sometimes expressed on the question whether or not primary chronic appendicitis exists as an entity. This is a matter of little importance; chronic appendicitis, whether primary or secondary, is as definite as chronic cholecystitis or chronic tonsillitis; clinically the condition is quite clear and the results of operative treatment in properly selected cases strongly support the accuracy of the term.

The term "appendix dyspepsia" is a haphazard expression which slipped into use when the effects of chronic appendicitis were being recognized, and has given the appendix an exaggerated position in the causation of that many-sided condition dyspepsia; as a result dyspepsia has often been attributed to the appendix without consideration of other causes. Now dyspepsia may be the result of a very large number of conditions, and considerable care and time may be required in determining its cause. It may be due to functional or organic causes, to simple matters such as infected teeth or chronic constipation, or to one of a host of abdominal lesions, or it may be due to two or three causes combined. If the question of the appendix as a cause is raised, it is clear that a most searching investigation must be made before other causes can be excluded; in particular the stomach, duodenum, and gall-bladder must be reviewed clinically and by X-rays, any degree of visceroptosis should be taken into account, and pains connected with the kidney, cæcum, and pelvis considered.

In chronic appendicitis there is often a history of slight but recurrent attacks and these are likely to culminate in a severe attack; everyone knows how often after operations for acute appendicitis there is revealed a story of several previous mild attacks. Most valuable of all is the evidence of the practitioners who may have found on one or more occasions convincing tenderness and rigidity over the appendix. In addition to this it will be noticed that the owners of diseased appendices, whether children or adults, are only getting sixty or seventy per cent. out of life; they often have a characteristic facial expression, they tire easily, sleep heavily and have poor appetites.

Short or long incisions.—The attitude of operators towards this question varies considerably. The problem is whether the appendix should be removed through a relatively small opening or whether a longer incision should be made so that other organs in the abdomen can be examined. The question is really one of diagnosis. If the operator believes that the appendix is solely responsible for the symptoms and has decided that no other organ calls for approach, then the operation should be done through a small opening; this allows him to remove the appendix easily, and incidentally he can through this opening examine the lymphatic glands in the right iliac fossa and the pelvic organs. If however, there is reasonable doubt about the patient's gall-bladder, pancreas, stomach, or duodenum, it is obvious that an incision must be made which will allow these organs to be seen in addition to removal of the appendix.

X-rays.—When time and the question of expense allow it, cases of suspected appendicitis should be X-rayed. Surgery owes much nowadays to the help given to them by modern radiology: an expert will be able to locate the appendix in nearly all cases, will report on its degree of functioning and demonstrate any abnormalities in its lumen and in its mobility. It must, however, be clearly understood that X-rays are not used to make the diagnosis: for instance, an appendix which with X-rays appears to be pathological may have no part in the causation of the symptoms. The work of radiography is to confirm the diagnosis, to locate the appendix, and to exclude other abdominal abnormalities. A knowledge of the position of the appendix may prove a godsend in those cases in which the organ lies in an unusual position. Recently I had a case in which X-rays showed the appendix running upwards over a duodenal diverticulum to the under surface of the liver: thanks to this information, the incision was planned in the upper abdomen instead of over the right iliac fossa.

OPERATION FOR APPENDICITIS

It is under this heading that the greatest improvement has occurred, so that removal of the appendix is now usually a simple procedure, involving only a short convalescence. To begin with, we are indebted very considerably to the modern forms of anæsthesia; personally, I find avertin followed by gas and oxygen the most satisfactory of the new methods. Avertin has the advantage that the patient goes to sleep before leaving his bed, and gas and oxygen administered by an expert ensures satisfactory relaxation of muscles for most abdominal operations. Other advantages of this method are that post-anæsthetic vomiting is absent, the patient quickly returns to normal after his operation sleep, and on account of this alone the stay in hospital is shortened by two or three days. It is true that avertin calls for rather more time from the anæsthetist and demands rather more careful supervision of the patient after operation; but these points are of small importance compared with what the patient gains. Avertin given in doses of two-thirds of the official amount is a most satisfactory form of pre-medication.

The time spent by the patient in bed has now been definitely shortened; the number of days must be determined for each patient. Robust subjects, such as schoolboys and healthy young men, may begin to get up after four or five days. The total stay in hospital or nursing home should never exceed a fortnight and is usually ten days or less.

Many of the points referred to in this article may appear quite simple, but they represent the main principles of treatment at the present time. The essential principle is sound judgment in diagnosis and decision; upon this will depend the results.

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RECENT ADVANCES IN THE TREATMENT OF THYROID DISEASE

By SIR THOMAS DUNHILL, K.C.V.O., C.M.G., M.D., F.R.A.C.S.

Honorary Surgeon to H.M. The King; Associate Surgeon, Professorial Unit, St. Bartholomew's Hospital.

HAVING been asked to contribute an article dealing with recent advances in the treatment of diseases of the thyroid gland,* and particularly with the problem of operation in cases of primary toxic goitre, I have interpreted this request liberally and digressed a little to examine the current view-point regarding the disease. Advances are naturally slow in their evolution, and only after observation and trial are they incorporated into general practice. Certain facts emerge gradually through the years till some of them become so obvious that they can no longer be ignored. Consulting physicians and surgeons from the nature of their practice naturally see a proportionately larger number of advanced cases than do family practitioners. Each has to give his evidence according to his own experience, but each should keep his sense of proportion so that experience may produce facts which will give a more accurate knowledge of the disease.

One fact has become increasingly apparent with each yearly presentation of the report of the Registrar-General. The number of deaths from Graves's disease in England and Wales in 1922 was 653. In each succeeding year an almost regular increase took place until, in the last year of the decade (1932), the number of deaths was 1,404. That the death-rate should have more than doubled in ten years is rather startling, and it should lead to re-examination of the methods of management of the disease. The increase cannot, I think, be entirely due to more accurate diagnosis.

Complications occur which in themselves may become so pronounced that the primary disease may not be sufficiently recognized; but it would surely be an unjustifiable criticism of our profession to suggest that as recently as 1922 it was not alert to the disease from which the complications arose, however predominant the latter may have become. The next question arising is whether or not the disease itself has become twice as frequent during this period. Those whose work brings them in contact with a considerable number of patients suffering from any one disease are scarcely in a position to evaluate its real frequency; but it is unlikely that the increase in the death-rate from this disease is entirely due to an increase in its incidence. Another possibility is that operation is more frequently performed and that the death-rate from this may be unduly high. Information on this point is not easily obtainable, but in the larger institutions the variation remains within narrow limits. It remains to inquire if our management is the best that can be achieved; and, however much the personal view-point may differ, whether we are succeeding in our efforts to do the greatest amount of good to the greatest number of sufferers.

Another fact that cannot be ignored is that, in spite of the advances made in both medical and surgical treatment in the last 27 or 30 years, the number of patients who come for treatment suffering from severe forms of the disease, or from serious complications, continues to increase. Medical and X-ray treatment can achieve more, and it is possible to carry out surgical treatment with far less risk than twenty, or even ten, years ago. Where then does the slide take place from a chronic disease in which the patients, although limited in their activities, are able to work and to obtain some enjoyment from life, to the condition in which, as wrecks of humanity, they are sent to hospital or to individual practitioners to be mended? That this slide occurs, and that it occurs frequently, is beyond doubt. It is equally beyond doubt that it results in a very grave condition for the patient. During the last fifteen years 203 patients have come to me with established auricular fibrillation, 47 with glycosuria, 35 with mental change, and many with extreme emaciation who have continued to lose weight even though they have been under treatment in hospital wards in the best circumstances obtainable. While admitting that a great many others have been helped, this cannot be regarded as a satisfactory state of affairs.

In 1930 I stated in this journal[1] that patients were usually seen in one of three stages :—(1) At an early stage, when the signs and symptoms are slight, and when the patient is under the control of the general practitioner and the consulting physician; (2) when the disease is established and in a chronic stage without complications; (3) when complications are present, or when the disease, even without complications, is severe and disabling. The disturbing fact is that so many patients slip from the second to the third stage with or without the knowledge of the practitioner, and thereby are robbed of their chance of restoration to anything approaching normal health. Furthermore, the death-rate in the third stage, apart altogether from operation, is high. Of this I have definite knowledge from the number of patients who have died while actually awaiting admission to hospital. Does the slide take place so insidiously or so suddenly that the practitioner is faced without warning with a condition of much greater gravity? If this is the case, should not the earlier stages be regarded more seriously, and an attempt be made to prevent the occurrence of the slide, rather than waiting until its occurrence has rendered an operation more hazardous. If the severe and complicated cases are placed in a class by themselves the death-rate may be as high as 7 per cent., whereas if *all* patients operated upon are classed together the death-rate varies from 1 to 3 per cent. Even when operation is carried through successfully as regards life, in the severe later stages, the result is too often a survival rather than a recovery.

For many years I have written that in the earlier stages the treatment is entirely medical, and that in the chronic stage—apart from the economic factor, which affects the poorer classes of the community more than those who are able to live a sheltered life—it is still a question of co-operation between physician, surgeon, and patient, when we may, and perhaps should, take into account the predilection of the patient without exerting undue pressure in favour of operation. At the same time I have insisted that if improvement is not definite within a reasonable time, operation should be urged. This attitude was taken deliberately, because it seems to me inexpedient to push surgery in a condition in which, in the earlier stages at any rate, our medical colleagues are persuaded that in many cases cure can be achieved by medical means; and radiologists feel the same in regard to their methods of treatment; furthermore, the disease itself being chronic, we should within certain limits allow the patient to decide the treatment she desires. Those limits are that at the first sign of losing ground, or if improvement does not occur, the opportunity of having the condition dealt with surgically should be given or even pressed. I have, however, been compelled to change my views because, in spite of greatly improved methods of medical management and more precision with X-ray treatment, the number of patients with irremediable complications increases, and the record of the Registrar-General speaks for itself. It can no longer be doubted that if a patient suffering from this disease has not been restored to equilibrium in the very early stages, she is doomed for life to a lower plane of health and, in many instances, to a worse fate.

I have also been very loath to speak too strongly in favour of surgery lest it should become an accepted dictum that the treatment for a dystrophic thyroid is inevitably surgical, and that operation should be carried out without delay. It would be unfortunate if this belief became universally accepted. Medical treatment can do a great deal. It can cure some patients; but evidence accumulates that there are far too many who are not cured.

Lest it be thought that the case has been overstated, let me give the story of three patients whose names appeared on the same operation list one afternoon recently at the L.C.C. Hospital, Hampstead.

One patient, aged 43, had had a goitre most of her life, which for many years had not given any trouble. Then breathlessness occurred and the heart became irregular. The cervical part of the goitre was large, and a skiagram showed deep intrathoracic extension with the trachea displaced far to the right and compressed. The laboured breathing was combined with breathlessness due to heart failure. œdema extended to the waist and fluid was present in the thoracic cavity. This condition had been in progress for a long time. The patient rapidly deteriorated while awaiting her turn for admission and had to be taken in as an emergency case. Fluid was aspirated from the thorax on three occasions, and it was five weeks after admission before it was considered safe to take the risk of ligating the superior thyroid arteries. The succeeding stages have since been carried out and the patient is well.

The second patient on the same afternoon was suffering from primary toxic goitre. The gland was very big, the neck measurement being 40 c.m. in a thin woman. She had been ill for eight years. The eyes were so prominent that chemosis was present, and the other symptoms were equally severe; even in bed the pulse rate was 130–140. After a long rest in the hospital it was decided to ligate the superior thyroid arteries. Avertin was given to minimize the effect of the preparation on the day of operation. The pulse rate at once rose to 216 and it remained over 200 for the three succeeding days, and very slowly fell to about 130. A fortnight later, with morphine and scopolamine combined with local infiltration of the area, but without avertin, the two superior thyroid arteries were tied and, at a later date, one lobe was removed. This patient still remains too ill for the second lobe—which is very large—to be dealt with.

The third patient had been in bed for eight months, the pulse rate rarely falling below 130. With hospital treatment it fell to 120. I then thought it would be safe to do a subtotal thyroidectomy. I considered ligation in this case, but thought that perhaps I was becoming obsessed with the idea of the necessity for preliminary ligation in patients who had been very ill. To my great regret this patient died the day after the operation. That three patients so severely ill should appear on the same operation list is surely significant.

It is by no means always to be laid at the door of the practitioner that operation is delayed until a time when it is fraught with danger. Some patients are naturally afraid of operation, and in an operation of this type it is of the utmost importance to have the patient's co-operation. The three following cases are instructive.

A highly educated man thought that a camping trip to the South Downs would cure him—this after many months of illness. When this failed, he was equally sure that a trip to Colombo would be successful. On reaching Ceylon he realized that he was worse and cabled asking for operation in the week following his return. This man was naturally afraid, and I still think that it was wise to wait until he gave his co-operation.

In the second case an appointment had been made for a patient, not excessively ill, at a time which seemed convenient for the patient (in the West of England), the general practitioner, the consulting physician, and the surgeon. In the intervening weeks mental derangement occurred and the patient passed into a condition of acute confusional insanity.

In the third case, while in a nursing home—the disease not apparently very severe—loss of weight began to be alarming. It was quite uncontrollable and a patient of normal weight became emaciated in a few weeks. In the last two cases the operation had to be carried out in four stages.

In each of these cases the practitioner was alert to the change that was taking place but it could not be arrested, and therefore, in our vision of the disease, account must be taken of such cases. It becomes very questionable if for the sake of those who respond to medical treatment in the early stages so many patients should be left to reach this condition, for records of cases similar to these three could be multiplied almost indefinitely. This is *not* a plea for operation in all cases; it is a plea for wider vision. Toxic goitre has been considered a manageable disease; is it as controllable as is usually believed?

Far be it from me to imply that all cases are cured by operation. The disease robs the patient of something that is irreplaceable; but the longer operation is delayed the more the patient loses, and I still think that restoration to health is more nearly complete by this than by other means.

TREATMENT

Environment still plays some part in the evolution of the disease and a large part in increasing the severity of the symptoms. For this reason the patient can rarely be treated effectively at home, and treatment should be institutional unless the home surroundings are ideal. In this way only can adequate physical and mental rest be obtained. Not infrequently restrictions are made too rigid. Complete rest in bed after a time may defeat its own object, and in many cases modified rest will achieve better results. The patient must be happy if good is to be attained. Friends and correspondence should not be too strictly excluded. Some patients can rest much more happily if allowed to do needlework; one patient got endless interest by making tiny rock-gardens on a bed-table.

Iodine.—There is some difference of opinion between the two branches of the profession on the question of iodine. Its immediate effect is striking. Physicians are inclined to believe that a patient may be kept on a higher level of health with iodine given continuously. Surgeons know to their own anxiety and the patient's cost that if iodine is given in large doses and over a long period, the patient is often robbed of its aid at the time when it is most needed. It is of great use in early cases to determine whether or not equilibrium can be re-established, and also when a physician has a very ill patient under close control while attempting to get her ready for operation in circumstances that enable him to watch every change. In the latter case the surgeon should be in close co-operation throughout.

Anæsthesia.—My colleague, Mr. Geoffrey Keynes, recently indicated the usefulness of avertin and gave the procedure usually employed[2]. It should not be used universally. For patients unduly anxious about the operation, and with organs reasonably sound, it is most useful. It is certainly a comfort to the patient to go to sleep in her bedroom and to wake up without knowing that she had been to a theatre and undergone an operation. It is undeniable that in patients whose organs are not sound it has dangers. The amount given should only be sufficient to induce sleep, surgical anæsthesia being obtained by other methods. The effect of avertin on one patient seriously ill has been already related in this article, and I have had a similar experience with others. Whether avertin or a preliminary dose of morphine and scopolamine has been given, the neck is infiltrated with local anæsthetic solution. This enables the operation to be carried out with nitrous oxide and oxygen alone without any admixture of ether. I feel more and more strongly that ether sometimes brings in its train morbid sequelæ—vomiting, or coughing with mucus, and possibly lung complications. These may not be common, but they add something to the mortality of the operation. The administration of nitrous oxide and oxygen may be a little more cumbersome and require more technical skill, but these considerations must not interfere with the welfare of a patient suffering from a serious disease.

Operation.—Thyroid surgeons have from the beginning practised and advised grading the amount done at one stage to what it is believed the patient can tolerate. Extended experience continually strengthens this view. The majority of patients in the chronic stage operated upon after careful preparation will stand a subtotal thyroidectomy by a surgeon accustomed to thyroid surgery without undue risk; but many patients who come are gravely ill, and for them safety is only achieved by special measures. Among these, preliminary ligation of the superior thyroid arteries is the chief. This requires care and preparation. It can then generally be accomplished safely, and is usually followed by some improvement in the patient's condition. Occasionally it may be necessary to ligate the inferior thyroid arteries later if the pulse rate in bed remains over 120. When dealing with the superior thyroid arteries the ligature should include the two main divisions. If the trunk alone is ligated before its division, the anastomotic loop from the inferior artery will still carry blood around the upper pole and carry blood to the opposite lobe. Aitken Walker has shown that more of the gland is supplied by the superior arteries than is usually thought, and the clinical effect on a patient generally bears this out. The inferior thyroid arteries can be found and ligated readily. Occasionally in a large and friable gland the veins may bleed so easily that the field becomes obscured, and it is more difficult to find the arteries. Here, as always in thyroid surgery, careful dissection and delicate handling are essential.

As an example of the result of ligation of arteries, one patient whose normal weight was over eight stones had lost weight until she was under five stones and continued steadily to lose weight. After ligation of the superior arteries she did not lose any more, but she did not gain. After ligation of the inferior thyroid arteries she gained over one stone in a month.

In performing the main operation control of bleeding and careful handling remain the chief considerations throughout. It is almost always possible to see vessels before they are divided. Double clamping or double ligation saves much time and conserves the patient's blood. I believe this is the one really important reason why thyroid operations are carried through with less shock and fewer crises than formerly. One is frequently asked how certain complications of operation are treated. When the preparation has been thorough, the operation graded to the patient's strength, and the manipulations carried through with precision and with the minimum loss of blood, there should be little reaction.

Children.—The disease not infrequently occurs in children, and this presents its special problem. I have always considered it wise to conserve the gland as long as possible, but not at the expense of the well-being of the child. In the early stages, X-ray treatment may be sufficient to control it. In some cases, the activity of the gland must be lessened by ligation of the arteries—two or even four. In others, the disease will advance in spite of these measures, and it will be necessary to remove an adequate amount of gland tissue.

In this, as in other diseases, we should place ourselves in the position of the patient and gain her confidence.

Both patient and practitioner must realize that this disease is really a very serious one, and if its course is not arrested complete recovery is unlikely, for some of its later effects are irremediable. The patient should never be promised too much. The best results are wonderfully good, and there are many such—for example, in patients with established auricular fibrillation normal rhythm is regained in 80 per cent. after an adequate operation; this occurs spontaneously in about half the cases, and in the remainder by the administration of quinidine. Some patients, although greatly improved, will still have some limitations, and they should know this before rather than after the operation. An advance in methods of investigation is the ability to measure the toxicity of the disease by electrical means—the "angle of impedance," first carried out in this country by Dr. Brazier.

CONCLUSIONS

(1) The annual reports of the Registrar-General reveal that the death-rate from toxic goitre has more than doubled in ten years (1922–1932).

(2) In spite of advances in medical management and X-ray treatment, the number of patients with severe complications who come for relief increases.

(3) The " slide " from an apparently manageable to an unmanageable condition may start insidiously and progress quickly, and it *does* occur frequently.

(4) In most of these severe cases life can be saved by operation and a considerable measure of health restored, but some vital capacity has been lost.

(5) In most patients in whom operation is to be performed restoration to health would be more complete if this were carried out before complications occur.

(6) Measurement of the " angle of impedance " gives an indication of the toxicity of the disease.

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RECENT ADVANCES IN THE TREATMENT OF BLOOD DISEASES

By L. J. WITTS, M.D., F.R.C.P.

Assistant Physician, Guy's Hospital; Will Edmonds Clinical Research Fellow.

RECENT advances in the treatment of blood diseases have been effected by the introduction of new remedies and also by refinements or greater precision in the use of old remedies. Improvements in therapeutics have to a large extent been the consequence of improvements in diagnosis. For example, the clinical resemblance between aplastic anæmia and hæmorrhagic purpura may sometimes be so close that they can only be distinguished by complete examination of the blood. Purpura hæmorrhagica is relieved in the most striking manner by splenectomy, an operation which is not only useless but may even be harmful in aplastic anæmia. The operation of splenectomy would soon be brought into disrepute if it were performed haphazard in all forms of purpura, without regard to the blood picture. The same is true for most of the therapeutic measures in anæmia; their value has been determined by the isolation of separate disorders of the blood and their study under controlled conditions. Disorders of blood formation are usually highly specific in etiology and response to treatment, and exact diagnosis must precede successful treatment.

An important aspect of treatment concerns the prophylaxis of anæmia. There is a special predisposition to anæmia at certain epochs of life, more particularly infancy and pregnancy. In the poorest classes of the community 50 per cent. of the infants and the adult women are anæmic. This anæmia could be prevented by a diet containing adequate amounts of iron, copper and first-class protein. It has been proved that the resistance to infections in children is diminished by anæmia and the same is probably true of the pregnant women—*Bacillus coli* pyelitis at any rate appears to be more frequent in women who are anæmic. Prophylaxis of anæmia of this type is now a social rather than a medical problem and it cannot be long delayed.

Iron has been used as a remedy for anæmia since prehistoric times. It was first employed as a form of sympathetic magic, in the hope that the patient might imbibe the strength of the metal. Steel wine (vinum ferri) which has been deleted from the last edition of the British Pharmacopœia, and the popular injections of iron, arsenic and strychnine, bear witness to the survival of similar beliefs in our own time. Later, iron was regarded as a mysterious stimulant to blood formation, and it was held that certain preparations, such as magnetic iron, were more stimulating than others. These theories have been replaced by exact investigations on animals artificially rendered anæmic and on carefully controlled chronic cases of anæmia in man, as a result of which we now know that iron is of value in anæmia as the raw material for the manufacture of hæmoglobin. Different preparations vary greatly in their availability to the organism and in their dosage. Remembering that iron is absorbed only in the duodenum and upper limit of the small intestine, and that in many patients with anæmia the solvent hydrochloric acid is reduced or absent from the gastric secretion, it is not surprising to learn that the potency of preparations of iron is directly proportional to the ease with which they go into solution and liberate free ionic iron. Organic preparations of iron, such as hæmoglobin, in which the iron is masked, have no therapeutic action. The best preparations of iron are the ferrous salts, such as ferrous sulphate, given alone or in the form of Blaud's pill, gr. xv, t.d.s. Reduced iron is too insoluble and the ferric salts too astringent. The scale preparations are useful on account of their solubility and tolerability but, as only a fraction of their iron is released in the free ionic form, they must be given in very large doses to be effective, e.g. iron and ammonium citrate, gr. xxx, t.d.s.

Iron should be prescribed in all forms of anæmia in which hæmoglobin is deficient and the colour index low. Its action is seen to best advantage in chronic hæmorrhagic anæmia, and in the idiopathic hypochromic anæmia of women, which is so often complicated by achlorhydria and menstrual disturbances. Recovery from pernicious anæmia is accelerated by a course of full doses of iron, in addition to the specific therapy with liver or stomach, and some observers believe that subacute combined degeneration of the spinal cord is benefited by massive iron therapy. All artificially fed babies, and in my opinion breast-fed babies also, should be given iron. It can be incorporated with the milk, or with less expense and greater palatability to the baby, prescribed as iron and ammonium citrate, gr. 1ss to iii, t.d.s.

Copper.—After the iron has been absorbed, it cannot be converted into hæmoglobin unless traces of copper are present to act as a catalyst. Many samples of medicinal iron contain sufficient copper for this purpose, and there is also more than enough in the ordinary adult diet. In infants on a milk diet, however, hæmoglobin regeneration may be held up for want of copper, which may then be supplied in the form of 0·5 per cent. solution of copper sulphate, 1 c.cm. per kilogram of body-weight per day. It is compatible, and may be incorporated in, a mixture with iron and ammonium citrate.

Arsenic.—The custom of adding arsenic to mixtures of iron, as an additional stimulant in anæmia, has fallen into abeyance, for there is not any evidence that it is of value for this purpose. The prescription of arsenic is now restricted to the treatment of the excessive proliferation of blood cells which occurs in polycythæmia vera and leukæmia, and to allied disorders such as Hodgkin's disease. Here arsenic acts as a depressant, rather than a stimulant, and its effects are closely comparable with those of the X-rays. Large doses are used, which must be carefully controlled according to the condition of the patient and the level of the blood count. It is usually administered as Fowler's solution of potassium arsenite, beginning with 2 minims and increasing to 10 to 15 minims thrice daily, after meals, until the desired effect is produced or signs of intoxication appear. The drug is then discontinued for four to six days, and resumed in a smaller daily dosage, in the effort to determine a maintenance dose which will control the illness.

X-rays.—Small doses of X-rays are said to stimulate the bone-marrow and have been used in the treatment of patients in whom the production of white cells or of blood platelets has been diminished. The results are not convincing, and the special field of application of the rays is in the treatment of erythræmia, leukæmia and Hodgkin's disease. It must be confessed that there is little evidence that the fatal issue is postponed, but the remission of symptoms is so remarkable that the span of useful and comfortable existence is much increased. It is unfortunate that X-radiation is rarely if ever applicable to the acute cases of leukæmia, which are relatively so common, and which are at present quite inaccessible to treatment. Nor are the rays of much, if any, value in chronic lymphatic leukæmia. The latter disease appears to have some affinity to exophthalmic goitre and symptomatic improvement may be produced by the prescription of Lugol's iodine solution.

Phenyl-hydrazine is another drug which has been introduced for the treatment of polycythæmia vera. It stimulates the liver and spleen to destroy the excess of red cells, and should therefore be used with the very greatest care, as the destruction persists for some days after omission of the drug, and the patient may become profoundly anæmic. Thrombosis may also occur. It should rarely be given in a higher dosage than 2 grains a day by mouth, and treatment should be guided by frequent blood examinations. As soon as the red cell count begins to fall, treatment should be interrupted so that the effect may be observed. In this way it is possible to find a dose which will maintain a normal blood count, and as little as 2 grains a week may prove sufficient.

Nucleotide.—We have long been familiar with the excessive proliferation of the white blood cells in leukæmia. The reverse change, in which the production of leucocytes is greatly depressed, so that a profound leucopenia develops and polymorphonuclear cells practically disappear from the blood stream, is a relatively new phenomenon. With the reduction in the number of leucocytes, the resistance to infection is greatly diminished, and the bacteria which are constantly present on the mucous surfaces of the body are enabled to invade the tissues. Owing to the special tendency to necrotic lesions of the mouth and throat, the disease is often referred to as *agranulocytic angina.* The cause is not known for certain, but there is good evidence that many of the cases result from the use of synthetic analgesic and sedative drugs of the coal-tar series, which contain the benzine ring.

The appearance of this malady gave fresh impetus to the study of drugs which stimulate the production of leucocytes. Nuclein had long been used for this purpose, but had the disadvantage that the increase of leucocytes produced by it was preceded by a negative phase, in which the leucopenia was temporarily exacerbated. Experiments revealed that this negative phase could be avoided by the use of the simpler chemical breakdown products of nuclein, the nucleotides, and these drugs have proved of value in the treatment of agranulocytosis, and also of the leucopenia which at times accompanies pneumonia, septicæmia and other infections. Pentnucleotide, the best known of these preparations, is administered by intramuscular injection in a dosage of 10 c.cm. once or twice a day. There is a latent period of three to five days before its effects become apparent.

Transfusions.—Shackle, in a paper this year on transfusion, points out that as recently as 1919 a successful transfusion was recorded in the Residents' Book at Guy's Hospital as something of an event. When the operation of blood transfusion was rendered simple and relatively safe by the discovery of the blood groups and the prevention of coagulation by sodium citrate, it was practised in a great number of diseases. Experience has shown that the chief indications for transfusion are the collapse of shock and hæmorrhage; hæmorrhagic disorders; and intractable anæmia which has not responded to simple medication. The value of transfusion in acute infections is still under judgment, but I must confess that I am more impressed by the dangers than by the advantages.

Splenectomy.—The value of splenectomy in acholuric jaundice has been known for many years. The brilliant success of splenectomy in cases of purpura hæmorrhagica in which the blood platelets are diminished is still hardly as widely known as it deserves to be. Bruising and hæmorrhage cease within a few hours of the operation, and a patient who has been confined to bed, and perhaps in imminent danger of death by exsanguination at every menstrual period, is restored to full activity. In neither of these diseases is the operative mortality high. The spleen may not be greatly enlarged, and it is usually free from adhesions. In splenic anæmia the mortality remains considerable and a successful issue after survival from the operation is far less certain.

Liver and stomach.—In the liver treatment of pernicious anæmia and allied anæmias we have the outstanding innovation of the last decade of hæmatological research. Just as the production of hæmoglobin is dependent on an adequate supply of iron and copper, so the production of red cells is dependent on the presence of the hæmatinic principle which is present in liver. The action of the liver principle is probably more akin to that of copper than of iron—it is a catalyst which is essential for the orderly development of the red cells. In its absence erythropoiesis is arrested, and only a few large unwieldy corpuscles are produced. The value of the liver principle is limited to those anæmias in which red-cell formation is depressed in spite of abundant supplies of hæmoglobin—the megalocytic anæmias in which the colour index is high.

The liver principle is elaborated in the stomach, by the interaction of a ferment secreted by the pyloric glands and a raw material present in the food, which is closely related to, but not identical with, vitamin B. Marmite is a rich source of this raw material, and is therefore used for the megalocytic anæmia due to defects of diet, which is so prevalent in the tropics. In this country megalocytic anæmia is rarely due to errors of diet, but is the result of errors of digestion. In pernicious anæmia for example, there is achlorhydria and no specific ferment is secreted by the stomach. We must therefore practise substitution therapy.

It is interesting to recapitulate the stages in the progress of liver treatment. It is also important to do this, as many people have remained in the first stage, which I describe to my students as the "caveman era" of liver treatment. I refer to the ingestion of whole liver. We have learnt by bitter experience that patients cannot or will not eat enough whole liver to remain well for long periods. Of hospital patients with pernicious anæmia followed-up after the prescription of whole liver, less than a half have been found to remain well; nearly 60 per cent. are either paralysed, semi-paralysed or dead. The introduction of palatable oral concentrates of liver was an improvement, but the great expense has been a bar to adequate dosage in many cases. A much greater advance was the introduction of true substitution therapy with desiccated stomach by the mouth. Desiccated stomach is cheap and concentrated, and there is little excuse for any patient who relapses on treatment with stomach. Stomach preparations are difficult to standardize, almost impossible to sterilize, and not very palatable, but these disadvantages are being gradually overcome.

The final advance has been the preparation of concentrated extracts of liver for intramuscular injection. Liver extract may be anything from 50 to 100 times more potent when given by injection than when taken by mouth. It is possible to keep the blood count normal by a single weekly, fortnightly or even monthly injection of liver extract. We are undoubtedly in a transition period, but as I see the position now, satisfactory results in the treatment of pernicious anæmia are best obtained by the ingestion of desiccated stomach or the injection of liver extract. Whatever treatment is used, periodic estimations of the hæmoglobin are essential, for the blood count can and must be kept at a normal level. If we are to reduce the mortality from pernicious anæmia—and so far we have failed to do this—we must do more for our patients than simply to tell them to eat liver.

THE TREATMENT OF HIGH AND LOW BLOOD-PRESSURE

By CLIFFORD HOYLE, M.D., M.R.C.P.,
Paterson Research Scholar, Cardiac Department, and Demonstrator in Pharmacology, London Hospital; Gillson Scholar, Society of Apothecaries.

HIGH BLOOD PRESSURE (ESSENTIAL HYPERTENSION)

"THE greatest danger of chronic nephritis is that someone will find it out."[1] However true this aphorism it applies still more to other forms of hypertension. Nothing does more harm than over-treatment with its strenuous regard for trivial changes in the pressure. Fashionable remedies serve as expensive placebos but we should now recognise that they rarely have a greater value. Some subjects of hypertension need little or no treatment, as they are largely free from symptoms and the existing pressure cannot be permanently altered. The patient is better kept in ignorance of his hypertension. As Lewis[2] writes "it is a technical detail that should not be allowed to concern them." Cheerful reassurance may well be expedient, for an infectious concern by practitioner and family is much to be avoided.

Treatment scarcely ever does more than reduce the burden of the disease even when there are persistent symptoms. Though a hypertension cannot be removed by dealing with the underlying causes it may often be regulated to some extent, or at least its effects upon the patient may be reduced to a minimum. It is easier to relieve symptoms than to lower the blood pressure, even temporarily; but for both, two measures —mental and physical rest—have a special value.

Mental rest.—The first of these is to secure relief from mental worry and anxiety. This may mean that the habits of a lifetime want revision. Many hypertensive patients lead arduous lives full of business or family difficulties which they need to avoid. Often this is an economic rather than a medical problem and any advice seems like a counsel of perfection. Even so it has a value for, as Huchard said, the question is one not of a drug but of a regime. Osler[3] wrote of the "consolation of sensible advice," for symptoms are so often governed by psychological factors. Only recently this has been clearly shown by Ayman[4] who found that 33 out of 40 unselected patients with high blood-pressure were improved during treatment by a few drops of dilute hydrochloric acid daily as a placebo. If a further proof were needed of the importance of suggestion it is that one of the main difficulties in judging the value of remedies is the ease with which the results are invalidated. Sometimes in neuropathic subjects with hypertension its effects may be remarkable; Mueller mentioned the simultaneous disappearance of high blood-pressure and depressive states, and he also instanced[5] one striking example of hypertension apparently due to an emotional state.

This patient had a systolic blood-pressure of 280 mm. Hg, with attacks of pulmonary oedema. After a satisfactory solution of certain conjugal difficulties the blood pressure rapidly fell to normal with complete relief of symptoms and he remained well subsequently.

Psychic factors are a contributory cause of symptoms particularly about the menopause; suggestion may then have an additional value.

Sedative drugs are a further means of securing some measure of reassurance, though their use is based largely upon general principles. It is probably unimportant which particular one is used provided that the dose is sufficient for a therapeutic effect. Expensive proprietary members of the group have not been shown to have special advantages. While symptoms may be relieved by sedatives the height of the blood pressure is influenced far less, though a moderate fall has been recorded.[6, 34]

Physical rest.—Many patients, though not all[7], show a rapid but moderate reduction in blood pressure during rest in bed. It generally occurs within a fortnight and exceptionally the pressure may even return to a normal level. If the hypertension is malignant, or the case one of long standing with much vascular sclerosis, then rest however prolonged has little effect. When the pressure does fall during rest it usually rises again to former levels with a return to ordinary life. But even the partial aid of long rest at nights or an occasional day or two in bed has its effect. Rest in bed of this kind, or more, should be used early in the cardiac failure of hypertension; it is advisable when there is only breathlessness during brisk walking without congestive signs. Improvement from it often lasts for long periods afterwards when the blood pressure has returned to its former level.

Rest apart from confinement to bed is important at the earliest stage. As Rolleston[8] wrote "A hard-working and hard-living man of affairs must relax and reduce the stress and strain of his existence, he must learn to play, to take real holidays and frequent days or week-ends off, to follow hobbies and avoid overeating." Nevertheless there are few occupations that cannot be continued until complications supervene such as heart failure, angina of effort, or a coronary or cerebral thrombosis. These are the limiting factors to a much greater extent than the height of the pressure or its commoner symptoms.

Reduction of weight.—Many hypertensive subjects are overweight, and evidence accumulates to show how great is this disadvantage. Fisk[9] and Terry[10] both found that persons considerably overweight had also a special tendency to a high blood-pressure. A more potent argument for weight reduction is that obesity increases the cardiac load and so may lead to a premature congestive heart failure. In addition it hinders respiratory movement. Reduction of weight in obese subjects is thus specially important for the prevention of dyspnœa; it is to be secured by moderate exercise and dieting. There is no reason why steady exercise such as walking, cycling, golf, or riding should not be advised provided that it does not induce breathlessness. In this way it is far easier to maintain a moderate weight. Massage and indoor exercises are only suitable when the opportunity of outdoor exercise is denied.

Some control of diet is almost always necessary for many hypertensive subjects have been habitually excessive eaters. No diet has a specific effect but a gradual reduction of weight to the average often relieves symptoms, particularly breathlessness and dyspepsia, and may lower the blood pressure. The essential point is to reduce the amount of food taken; the total calories consumed are far more important than the exact nature of the foodstuffs. A diet of 1,200 calories daily is usually ample. Once excessive weight has been lost the diet should be maintained at the minimal required to prevent a further loss.

Other dietary measures.—Only with renal failure does special restriction of protein become necessary. Protein is in no way harmful to most of these patients. Mosenthal[11] and Strouse and Kelman[12] have shown that a diet poor in protein does not diminish a raised blood-pressure, nor one rich in protein raise it. Indeed ample protein should be advised, for unnecessary restriction may eventually lead to harmful metabolic changes and anæmia.[13] Moreover the type of protein food taken is unimportant: if it is preferred meat may be taken as safely as fish, eggs or milk. There is no foundation for the former view that red meat is more harmful than protein in other forms.

Restriction of salt and of fluid are other dietary measures which have been advocated. Ambard[14] was the first to recommend a restriction of sodium chloride, and his views at first received considerable support.[15, 16]

Allen and Sherrill[17] reported on 180 severe cases of hypertension treated by rigid salt restriction for periods up to 3 years; 18·9 per cent. regained a normal blood-pressure and a further 41·9 per cent. were distinctly improved. Unfortunately later investigations have not confirmed these striking results. Rigid salt restriction gave no better results than rest and moderate salt restriction according to McLester[18] and O'Hare and Walker.[19] Berger and Fineberg[20] found similar negative results even when the sodium chloride content of the diet was varied from less than one to over 30 grams daily. The results formerly attributed to salt restriction in uncomplicated hypertension must therefore be ascribed to spontaneous improvement, or to the effects of suggestion. Some fall in blood pressure may accompany the weakness and other symptoms of salt privation but without clinical improvement. On the other hand when there is cardiac failure with œdema a fairly rigid salt restriction is beneficial. If no salt is added to the food and if salty foods are excluded only about 2 to 4 grm. of sodium chloride will be taken daily.[21] A diet with less salt than this is expensive, difficult to prepare, and so monotonous that it soon leads to loss of appetite.

There is no purpose in restricting fluids unless there is congestive heart failure. Then the total quantity should not be greater than one to two pints daily. Indeed when œdema is marked a few days of almost complete starvation and thirst may be very effective. Both fluid and salt restriction probably help the failing heart by reducing its work, for Grollman[22] has shown that a free fluid intake increases the cardiac output. But even amounts up to six litres a day do not influence blood pressure materially.[23]

Vasodilator drugs.—The treatment of hypertension by drugs has been one of the most disappointing chapters in therapeutics and they have come to occupy a relatively minor place. A few must be reckoned indispensable: sedatives and hypnotics; morphine for cardiac asthma or a complicating coronary thrombosis, with digitalis and salyrgan when there is cardiac failure; and nitrites for angina of effort. With these few exceptions the pharmacopœia would be well lost to most hyperpietics. Sedatives have already been mentioned; in uncomplicated hypertension they have more general value than any other remedy. When used for insomnia full doses are needed. Analgesics are often of little use for headache unless the patient also rests.

A large number of remedies have at one time or another been given in the hope of lowering a raised blood-pressure. None of them has ever had strong claims for continuous administration and without exception they have belied an early reputation. The nitrite group of vasodilators have had the longest trial. Their effect upon the blood pressure is often proportionately the same in hypertension as in health,[24] though Mackenzie[25] wrote of their ineffectiveness in elderly subjects, and in nephritic or malignant hypertension also they have little or no effect.[26] But their slight and transient action in doses that can be taken has long ago precluded their continuous administration with the object of reducing the blood pressure permanently. Apart from relieving associated angina of effort[27] and certain varieties of headache they have no place in the treatment of hypertension. The latest addition, bismuth subnitrate has proved equally disappointing[28] though it was introduced by Stieglitz[29] because it was thought that slow conversion into nitrite in the gut might lead to a prolonged and gradual vasodilation during absorption.

Other vasodilators such as diuretin, theocin, and euphyllin are equally inert. Iodides have had a long sustained reputation, chiefly because it was once thought that they act as vasodilators.[30,31] Stockman and Charteris[32] showed in 1901 that this is not so. Their therapeutic effect in hypertension is probably no greater than that which can be obtained with any placebo, except when syphilis or thyro-toxicosis[40] is associated. In the latter the action of iodine or iodide will be through the abnormal thyroid gland, and often it may be beneficial.

Recently sulphocyanates have been re-introduced as vasodilators in high blood-pressure. Gager[33] used pure potassium thiocyanate in an aqueous solution containing 0·1 gm. (1·5 gr.) in 4 c.cm. (1 drm.); this was given thrice daily after meals for one week, twice daily in the second week, and once daily for the third week or indefinitely. Fineberg[34] used doses up to 5 grains three times a day. Most writers agree that the blood pressure falls in a proportion of the patients, but it rises again when the drug is discontinued. Other improvement has not been greater than can be obtained by general treatment. A more serious objection to sulphocyanates is their narrow margin of safety. This was pointed out as long ago as 1904 by Pauli[35] and others [36, 37] and has been stressed again recently by Ayman.[38] Gastro-intestinal irritation, rashes, weakness, and cerebral symptoms such as mental confusion and hallucinations are all rather frequent, and two fatalities were reported by Goldring and Chasis.[39] With such risks the drug scarcely commands a further trial.

Endocrine preparations.—A large number of extracts of various endocrine glands have been lauded in the treatment of high blood-pressure. Thyroid extract has an established claim when there is also hypothyroidism even though the basal metabolic rate is normal. The symptoms due to the thyroid defect almost always improve, but without change in the blood pressure. Otherwise thyroid extract and preparations of endocrine glands of which it is the active constituent have no rational place in treatment. There are some hypertensive patients in whom thyro-toxicosis is associated, and in these thyroid extract is definitely harmful.[40] Riddoch[41] has given a similar warning against the haphazard use of thyroid at the climacteric when there is hyperthyroidism even of a minor degree. Other commercial preparations of endocrine glands have not been shown to influence hypertensive patients. Extracts of liver are also of more than doubtful value.

Digitalis and salyrgan.—Digitalis is often of great value in treating cardiac failure in high blood-pressure even though normal rhythm is usually retained. The best results, however, are seen when there is auricular fibrillation. One important limiting factor to the degree of improvement from the drug is the extent to which coronary atheroma is a principal cause of the heart failure. In this respect hypertensive patients differ from those with failure at a younger age from rheumatic heart disease. All the usual preparations of digitalis are now so reliable that the choice is rarely important. When congestive signs fail to improve during rest and administration of digitalis, an astonishing diuresis with considerable clinical improvement may often be obtained from salyrgan or neptal given in doses of 1 to 2 c.cm. intravenously or intramuscularly on alternate days. These organic mercurial diuretics should be used only when renal function is comparatively intact.

Physiotherapy.—Physiotherapy by means of high frequency currents[42] or diathermy[43] is thought to have some slight influence in reducing a high blood-pressure and in alleviating symptoms; but the weakness of such claims is the absence of control observations to show the spontaneous course of the disease in the treated patients. It is likely that the effects of physiotherapy can be attributed to suggestion by the methods used.

Venesection.—It is impossible to remove a sufficient volume of blood to lower blood pressure for long without producing harmful consequences. Even after removal of as much as 2/5ths of the total volume in animals the blood pressure quickly returns to its former level. The effect of venesection in hypertension is equally slight. Miller[44] found that the removal of half a litre only led to a fall of 15 mm. Hg. The effect on symptoms is also generally transient. But venesection will sometimes relieve the headache and other symptoms of " hypertensive encephalopathy " when they have resisted all other measures. These cerebral attacks are probably precipitated by additional rises of blood pressure[45] and a liberal venesection has a sufficient, though transient, effect on this rise of pressure. However, venesection has its greatest value in the emergency of heart failure especially when there is cardiac asthma with acute pulmonary œdema.

Operative measures.—In the rare cases of suprarenal tumour with hypertension, the tumour may sometimes be successfully removed. These patients are often young and have paroxysms of high blood-pressure accompanied by signs of extreme vaso-constriction, such as pallor and coldness of the extremities, with nervousness, tachycardia and dilatation of the pupils. Mayo[46] was the first to remove the causal paraganglioma of the suprarenal gland in such a patient, and Pinkoffs[47] has reported another. The proved association with a disorder of the suprarenals in such cases, has led to unilateral removal of the gland in essential hypertension but without any effect upon the blood pressure. An attempt to lower the blood pressure in malignant hypertension has been made by removing the 2nd to the 4th lumbar ganglia along with the sympathetic trunk and also dividing the rami; this led to vasodilation in the lower part of the body but without much clinical improvement.

LOW BLOOD-PRESSURE

Most cases in which a low blood-pressure is prominent are the subject of some acute illness, such as a hæmorrhage, surgical shock, a severe fever, a coronary thrombosis, or a rapid effusion into the pericardial sac. In each case treatment of the low blood-pressure is a part of that for the general condition. Chronic hypotension occurs in wasting illnesses and sometimes in mitral or aortic stenosis but it needs no special attention. Hypotension as a chronic state and sufficiently severe to be held responsible for symptoms is indeed very rare. In the severe form seen in disease of the suprarenal glands (Addison's disease) the pressure may be low enough to cause concern. Treatment by extracts of suprarenal cortex (eucortone, eschatin) has a greater effect on the general health than on the blood pressure, though sometimes this rises.

Besides all these varieties a modest degree of hypotension is often seen in normal individuals[48]—a physiological hypotension. A similar form is also met in some neuroses, when it is not uncommonly dignified as a cause of symptoms and may even become a gauge of treatment. Such a view is entirely unjustified and treatment should never be concerned with the blood pressure in the smallest degree.

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ADVANCES IN THE TREATMENT OF DISEASE IN CHILDHOOD

By RICHARD W. B. ELLIS, M.A., M.D., M.R.C.P.
Medical Registrar and Pathologist, Hospital for Sick Children, Great Ormond Street.

THE advances that have been made in pædiatrics during the past decade have been principally along biochemical lines, and in many instances it has been possible to utilize the facts observed in evolving a rational therapy. An attempt will be made in this article to illustrate the application of biochemical principles to the treatment of certain diseases of childhood, and also to consider particularly some of the general methods of treatment of the new-born.

KETOSIS AND THE USE OF GLUCOSE

Since the medical world became " acidosis-conscious," glucose has been used as a panacea for every condition in which ketone bodies could be discovered in the urine. It is unfortunate that so much emphasis has been laid on the occurrence of ketosis in childhood, since not only is there little evidence that the minor degrees of ketosis, such as give a positive Rothera but negative ferric chloride test in the urine, are themselves responsible for symptoms, but the too confident use of " acidosis " as a diagnosis is liable to result in the primary condition being overlooked. If the actual significance of ketosis is kept in mind, namely, the faulty metabolism of fats owing to a deficiency in the amount of available carbohydrate, and it is realized that only the more severe degrees of ketosis are likely to be associated with a true acidosis, the value and limitations of glucose administration will be better appreciated.

Ketosis may arise in any condition in which there is partial or relative starvation with regard to carbohydrate, for example in continued vomiting, faulty assimilation and pyrexial conditions in which there is a rapid metabolism of body fat. It may be artificially produced by diets in which the fat intake is disproportionately high and the carbohydrate intake low. It occurs readily in most young animals, including children, from rapid depletion of the glycogen stores of the liver in conditions of excessive fatigue and excitement. It is also a feature of such metabolic disorders as diabetes, in which the available glucose cannot be metabolized, and of the recently described condition, von Gierke's disease or hepatomegalia glycogenica, in which glycogen is stored in the liver and other organs but cannot readily be mobilized. When, therefore, ketosis arises from a simple or primary deficiency of carbohydrate, glucose administration can be expected to relieve any co-existent symptoms; when, however, the deficiency in available carbohydrate is secondary to some other factor, glucose cannot do more than help to adjust the disordered metabolism without affecting the primary cause.

As an example of the former group of cases one may take the "nervous" child. It was pointed out by Cameron[1] some years ago that many children of this type show symptoms closely resembling those seen in conditions of hypoglycæmia, namely, extreme fatiguability, restlessness, night-terrors and other disorders of sleep, ketosis being particularly liable to occur. These symptoms are apt to be most in evidence when the child has been for some hours without carbohydrate, i.e. shortly before a meal is due and during the night. It was suggested that they were in fact due to the rapid depletion of the glycogen reserves of the liver, with a consequent tendency to hypoglycæmia, and it was found that they responded well to a relatively high carbohydrate diet with the addition of glucose or barley sugar last thing at night and between meals. In contrast to this type of case, there is the example of the child in whom continued vomiting from some organic cause such as intussusception has produced a condition of secondary ketosis. Here the administration of glucose cannot affect the obstruction or vomiting, but will improve the child's condition for operation by restoring the depleted glycogen supplies of the liver. It should be mentioned that when there is a high obstruction, or continued vomiting occurs in the absence of diarrhœa, ketosis may be associated not with an acidosis, but with a potential or actual alkalosis, owing to the excessive loss of hydrochloric acid from the stomach. In these cases saline should be administered with the glucose in order to return the chloride content of the blood to normal.

With regard to the cases of so-called "cyclical vomiting," which are often all rather loosely referred to as examples of "acidosis," and for which glucose has been widely advocated, the etiology and rationale of treatment are much less certain. Although many children of the "nervous" type referred to above are subject to train- and car-sickness and recurrent vomiting attacks in which they develop a severe ketosis, there is little evidence that hypoglycæmia or ketosis precipitates the attack. Indeed, in some instances at least it has been shown[2] that between attacks a high fat-diet producing a considerable ketosis can be taken with impunity, without causing nausea or vomiting. In other cases it will be found that recurrent upper-respiratory infections precipitate the vomiting attack, and that the apparent periodicity really represents the period of immunity often observed between repeated colds or throat infections. In these children, attention to infected tonsils and avoidance of sources of infection will do much to lessen the frequency of the attacks. In others, again, the attack will conform more closely to the clinical picture of migraine. Graham and Morris[3] recognize both an acidotic and an alkalotic type of cyclical vomiting, and regard the former as due to a temporary impairment of hepatic function. There can in any case be little doubt that periodic vomiting arises from a number of different disturbances. While the following scheme of treatment is therefore admittedly largely empirical, it will be found to benefit the majority of children suffering from this symptom. Owing to the large functional element in many of these cases, it is possible that the fact of being on a strict diet is of more importance than its exact content.

Between the attacks, the diet should be plain, with a high carbohydrate and low fat content; give no fried foods, eggs not more than three times a week, and scrapings of butter only. Milk should be skimmed. Meals should be at strictly regular times, taken slowly, and not followed immediately by active exercise. This applies particularly to breakfast, which is apt to be rushed before school. Barley sugar or a glass of skimmed milk and a biscuit should be given at 11 a.m. and last thing at night. The bowels should be open regularly, and a small dose of mist. rhei cum soda t.d.s. before meals may be of benefit. It is of course necessary to avoid as far as possible sources of excitement known to precipitate attacks.

At the onset of an attack, which is usually heralded by nausea, headache and drowsiness, a glass of orange juice or sweetened lemonade, with ¼ to ½ grain calomel or a dose of mag. sulphate, should be given at once. If there has previously been constipation an enema is indicated. The child should lie down and take fluids freely (glucose in lemonade). Solid food should be reduced to a minimum for 12 hours, dry toast or bread and jam often being best tolerated. In this way it is often possible to abort an attack.

During the attack, when the ketosis and loss of chlorides may be considerable, the child's requirements will be fluid, glucose, and sodium chloride. If there is difficulty in retaining even fluids by mouth, it is a useful practice to give drachm doses of fluid half hourly, doubling the dose each time that the fluid is not vomited. The fluid of choice is equal parts of orange juice and normal saline, or 10 per cent. glucose in half strength normal saline flavoured with lemon. In this way dehydration, which may be severe and is intensified by the ketosis, is counteracted, a rapidly assimilable food is provided, and the chlorides lost in the vomitus replaced. It is inadvisible to give more than minimal doses of sodium bicarbonate at this stage, unless repeated estimations of the CO_2 and chlorine content of the blood can be made, owing to the danger of precipitating an alkalosis. In exceptionally severe cases it may be necessary to give half strength saline and 5 per cent. glucose by rectum or even parenterally. A gradual return to solid food should be made as soon as the vomiting is under control, starting with toast or bread and honey.

In addition to providing a readily assimilable food and combating ketosis, glucose also serves the functions of protecting the liver cells, by filling them with glycogen, against toxins and when given intravenously of causing diuresis by a rapid raising of the blood sugar. The former renders it a valuable therapy in all forms of toxic jaundice, the preparation for general anæsthesia, and the intravenous injection of arsenical compounds. The diuretic effect of intravenous glucose is made use of in the treatment of gastro-enteritis in infancy, in which there are often extreme oliguria and accumulation of toxic products in the blood; it has also been employed for the relief of severe night-sweats in pulmonary tuberculosis.

Method of administration. — As indicated above, glucose can be given by the mouth in 5 or 10 per cent. solution with saline, or in orange juice or lemonade. Except when fluids are required, ordinary barley sugar or honey is generally preferred by older children and is equally effective. For rectal use, a 5 or 10 per cent. solution in water or saline should be used, but even in these dilutions it is often found too irritating by younger children to be well retained; the rectal drip method is sometimes preferable to a single large enema. For hypodermoclysis, glucose should never be given in a strength greater than 5 per cent. if it is to be rapidly absorbed. The same applies to its intraperitoneal use, though this route is best avoided owing to the danger of causing a sterile peritonitis. Solutions of 5, 10 or 20 per cent. (the last when a diuretic effect is required, or to aid the absorption of fluid given hypodermically) are suitable for intravenous use; they should be freshly made up and sterilized, in which case they do not require special buffering.

INFANTILE TETANY

Under normal conditions there is a balance in the blood between the calcium and magnesium ions on the one hand, and the sodium and potassium ions on the other, the former tending to inhibit and the latter to increase muscular excitability. Recognition of the fact that in spasmophilia the serum calcium fell from a level of approximately 10 mg. per cent. to 6 or even 4 mg. per cent., at first caused the condition to be regarded as due to a simple lack of total calcium, and, indeed, the administration of calcium together with an anti-rachitic diet served to cure the disease in the course of four to six weeks. It was also found, however, that tetany could be produced by a condition of alkalosis, from continued hyperpnœa, or long continued vomiting, as in pyloric obstruction, and that symptoms could be cured in much shorter time than four weeks by the administration of calcium chloride or even of ammonium chloride. This clinical cure occurred before the serum calcium had risen appreciably. It is now generally agreed that the symptoms of spasmophilia depend not directly on the level of the total serum-calcium, but on the ionized and therefore available calcium which in turn is dependent on the acid : base balance of the blood. Rational therapy therefore consists in the immediate administration of calcium chloride which by virtue of its Cl ions tends to cause an acidosis and so render ionized calcium rapidly available; this is followed by treatment with calcium lactate (the acid radicle of which is broken down into CO_2 and water), cod or halibut-liver oil, and sunlight, in order to bring the total serum calcium back to normal. The calcium chloride should be given in doses of from 20 to 30 grains q.d. for three to four days, and then stopped, being restarted if symptoms recur. Hydrochloric acid in milk may also be given with advantage during the same period.

KETOGENIC DIET IN THE TREATMENT OF EPILEPSY AND PYURIA

Diets containing a high proportion of fat and a low proportion of carbohydrate, and therefore causing the appearance of ketone bodies in the blood and urine, have been used extensively during the past ten years in the treatment of epilepsy, and more recently in the treatment of chronic pyuria. The exact mechanism by which the control of the fits is effected is still obscure. The experiment was originally tried on the analogy of diabetic coma, in which the ketone bodies present in the blood were regarded as being responsible for the drowsiness. Subsequent investigations,[4, 5] however, make it appear more probable that the disease is influenced by the alterations in acid : base and water balance that arise secondarily to the ketosis, and this is to some extent borne out by the fact that a considerable number of epileptic children become mentally brighter rather than drowsy when they have been on the diet for some little time. When the prolonged co-operation of patient, physician, and cook can be obtained, there appears no doubt that this treatment is often of considerable value. Children on the whole give somewhat better results than adults. In a large series of cases treated by this method, Talbot[6] found complete relief of symptoms in just under 40 per cent., and Helmholz and Keith[7] in 160 children under fourteen reported freedom from convulsions in 36 per cent. and improvement in a further 21 per cent. The method has not, perhaps, had the full trial in this country that it deserves, since the diet is relatively expensive, somewhat unpalatable, although many children will take it surprisingly well, and must be rigidly adhered to for long periods.

Hospitalization is advisable while ketosis is being induced, and during this period the patient's individual preferences should be consulted as far as possible in constructing menus that are not unnecessarily antipathetic. Full details of the method are given in Talbot's "Treatment of epilepsy," but briefly the course to be adopted is that recommended by Helmholz[8]: 1 gram of protein is given per kilogram of body weight, and the total caloric intake calculated on the basis of 50 calories per kilo. A child of 30 kilos will thus receive 30 grams protein (120 calories), 70 grams carbohydrate (280 calories), and the balance of the required 1,500 calories as fat (120 grams). The second day the carbohydrate is reduced to 50 grams and the fat is increased correspondingly to keep the total caloric intake unchanged. By a daily reduction of the carbohydrate and increase in the fat, the child is by the sixth day receiving only 10 grams of carbohydrate, and a brisk ketosis has usually been induced.

A quite different application of artificially produced ketosis has been made in the treatment of chronic pyuria. It has long been known that bacteriostasis of *B. coli* occurs in urine when the p^H falls below 4·8, but it is extremely difficult to maintain such a high degree of acidity during life. When, however, the urine contains ketone bodies in considerable amount, the growth of coliform organisms is inhibited at a p^H of 5·6. The responsible factor is thought to be lævo-rotatory β-oxybutyric acid.[9] Helmholz,[10] who originally observed the bactericidal character of the urine of an epileptic child who had been on a ketogenic diet, applied his findings to a number of cases of chronic pyuria with good results. It was found that the urine rapidly tended to become sterile, and that, even when a congenital abnormality or hydronephrosis was present, the treatment served as a valuable preparation for operation. Subsequent reports have not all been equally good, but here again the percentage of successes is quite sufficiently high to make the method well worthy of trial in all obstinate cases. The induction of ketosis is carried out in the same way as in the treatment of epilepsy, but in this case the diet does not have to be used continuously for more than, at most, three weeks, since if the case is going to respond satisfactorily it will usually do so considerably before this time. If there is difficulty in maintaining the p^H below $5{\cdot}6$, ammonium chloride 1 to 3 gm. daily may be given to increase the urinary acidity.

HIGH CARBOHYDRATE DIET IN DIABETES

The dietetic treatment of diabetes in childhood has almost come full circle since the days when the condition was so rapidly fatal at this age that many physicians regarded any form of dietetic restriction as valueless, to the present time when diets are being constructed to provide as much or more carbohydrate than is normally eaten by a healthy child. This change of regimen is of considerably more importance to the young diabetic than to the adult, since not only is the average child particularly fond of carbohydrate foods, which renders the new dietaries infinitely less irksome and abnormal, and therefore much more readily adhered to, than the old, but owing to the importance of carbohydrate for normal growth, nutrition and activity, the diabetic is no longer distinguishable in these respects from his normal contemporaries. Diets containing as much as 200 or more grams of carbohydrate per diem have been used successfully in the treatment of diabetic children, and Payne[11] has made the interesting observation on cases stabilized before and after the introduction of these diets, that a diabetic child will often ultimately require little if any more insulin on a high carbohydrate diet than he did when his carbohydrate intake was relatively low.

It appears therefore that there is an actual increase in carbohydrate tolerance under this regime, although it is of course necessary to treat every such case with an adequate daily dosage of insulin to maintain the blood-sugar within normal limits. If hypoglycæmic levels are aimed at, there will be interference with growth.[12] An interesting confirmation of this increase in tolerance has been furnished by the observations of Professor A. Ellis,[13] who has treated a number of cases of diabetes intensively with hourly administration of insulin and glucose for periods of up to eight days. In the early and mild cases, particularly in young subjects, a very striking increase in tolerance occurred, and although Ellis is inclined to regard this as temporary in character, it may be found that some such intensive treatment can usefully be employed as a routine when early cases first come under observation.

MANAGEMENT OF THE NEW-BORN

The modern attitude to the new-born may be summed up in the words of the troubadour—"*Plus faict douceur que violenz.*" The "Sarah Gamp" methods of smacking, sprinkling with cold water, and applying violent artificial respiration, with its attendant danger of fractured ribs or a ruptured viscus, have given way to the realization that an infant that fails to cry or suck is likely to be suffering from shock and possibly cerebral hæmorrhage, while the stimulus required for respiration is a central and chemical rather than a peripheral and physical one. Apart from warmth and a minimum of disturbance, infants suffering from cerebral hæmorrhage (which should be suspected in all cases of precipitate, premature or difficult labour, in which the infant is born in a condition of severe and persistent shock, particularly if there is any subsequent bulging of the fontanelle or evidence of hæmorrhage elsewhere) should be given 10 to 20 c.cm. of maternal blood into the buttocks as soon as possible. It has been suggested that they are best nursed in the upright position, on the analogy that hæmorrhage continues most freely in a dependent part, and the rectal injection of hypertonic saline (60 c.cm. of a 10 per cent. solution), has been advocated[14] in order to reduce intracranial pressure.

Hæmorrhagic disease of the new-born, a condition which may manifest itself as melæna, oozing from the umbilicus or vaginal hæmorrhage, is usually adequately treated by a single intramuscular injection of maternal blood, though this may have to be repeated if the hæmorrhage has not completely ceased in 24 hours. Indeed, the routine administration of maternal blood following delivery in some maternity hospitals has almost entirely done away with hæmorrhagic disease of the new-born. Certainly the procedure might well be adopted routinely in all cases of difficult and breech delivery. When the hæmorrhage has been considerable, a transfusion of the infant may be necessary; the control of the bleeding is also more rapid than when the blood is given intramuscularly, but the procedure requires special technique since the sinus route in these cases is even more than usually undesirable owing to the danger of intracranial hæmorrhage. Repeated small blood transfusions have also been found to be of considerable value in the treatment of icterus gravis neonatorum,[15] sepsis, prematurity, and so-called " congenital " anæmia.

Recently, inhalation of CO_2 has been widely employed to stimulate respiration in the new-born, since its value, due to direct stimulation of the respiratory centre, has been abundantly proved in older children and adults. There can be no question that it is of considerable service in the treatment of infants who are breathing feebly and are suffering from partial atelectasis, but the case of the infant who is born deeply cyanosed and has not breathed appears to be essentially different. Here the available evidence[16] points to the CO_2 content of the blood having reached and passed the level at which any further stimulation of the respiratory centre can be expected, since it is present in such concentration as to be acting as a direct poison. The immediate need of the infant at this time is therefore for oxygen and the expiration of CO_2. When these conditions have been met, subsequent inhalations of CO_2 may have a beneficial effect.

The good results that have been claimed for the use of CO_2 in this type of case are probably due at first to the oxygen with which it is generally given. Judiciously used, however, CO_2 is of considerable value in the new-born period, and is best administered through a well-fitting face mask, in a concentration of 5 or 10 per cent. in oxygen. Inhalations may be given intermittently for several minutes, depending on the reaction of the patient. Any form of artificial respiration should be preceded by removal of mucus or liquor amnii from the mouth and air-passages; this may be done by aspiration through a soft rubber catheter. It may be mentioned here that in older infants and children, CO_2 inhalations may be used with advantage in cases of broncho-pneumonia, collapse of the lung, and after operations on the abdomen and for empyemas, since deficient expansion of the lung is an important factor in at least some cases of unresolved pneumonia and bronchiectasis.

PROLONGED ARTIFICIAL RESPIRATION

In conclusion, mention should be made of the Drinker respirator,[17] an apparatus manufactured in this country by Messrs. Siebe Gorman & Co. Ltd., and designed for the application of artificial respiration over periods of many days or weeks. It consists

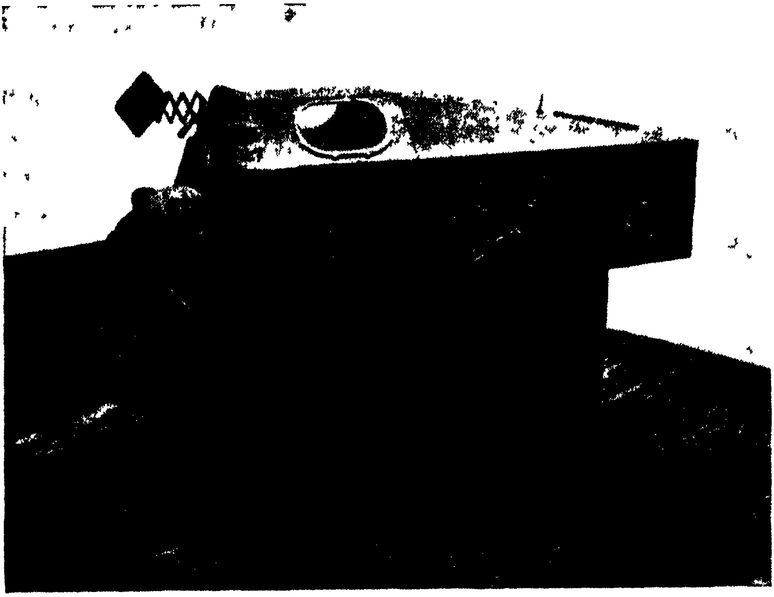

FIG. 1.—The Drinker respirator.

essentially of a tank into which the patient is placed, his head protruding through a closely fitting rubber collar; by means of an electrically driven pump, air is driven into and sucked out of the apparatus, thus creating within the tank, alternately, positive pressure which collapses the chest and negative pressure which expands it. In practice, only negative pressures are used, the chest being allowed to collapse spontaneously. The rate and depth of respiration can be varied at will, care being taken to avoid excessive hyperpnœa and consequent alkalosis.

This type of apparatus has been used extensively in the treatment of carbon monoxide and other forms of poisoning, drowning, acute poliomyelitis affecting the respiratory muscles or centre, post-diphtheritic paralysis, and atelectasis of the new-born. In acute poliomyelitis, the best results are to be expected from those cases that can be kept alive while recovery of paralysed respiratory muscles takes place; the bulbar type of case is generally more severely affected. The relief afforded to a conscious patient with respiratory paralysis is often extraordinarily dramatic, and I have seen a child who had been fighting for each breath, drop asleep within five minutes of being put into the apparatus. Several London hospitals are now in possession of respirators of this type, and it is to be hoped that local authorities will ultimately make them available throughout the country.

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RECENT ADVANCES IN THE TREATMENT OF CHRONIC RHEUMATISM

By W. S. C. COPEMAN, M.A., M.B., M.R.C.P.

Physician, British Red Cross Society Clinic for Rheumatism, Peto Place; Assistant Physician, Children's Department, West London Hospital and Hospital of St. John and St. Elizabeth; Consultant, L.C.C.

RECENT advances in the treatment of rheumatism can only be considered systematically with relation to some simple classification of the clinical types of disease for which such remedies are indicated. For this purpose it is convenient to consider cases as falling into the following categories: (1) Non-articular forms, including lumbago and sciatica; (2) rheumatoid arthritis, of both known and unknown etiology; (3) osteo-arthritis, including the "climacteric" form. This classification is on broad lines and it is not claimed to be entirely satisfactory from the academic point of view. It will, however, serve as a means of considering certain therapeutic methods in a more systematic manner.

The various forms of therapy to be considered should also be classified by some method in order that the effects expected from them may not be lost sight of, and pure empiricism, which perhaps flourishes more in a rheumatic soil than elsewhere in the field of medicine, be permitted to supersede such physiological principles as can be recognized. With this object in view, treatment will be briefly dealt with under the following headings: (1) Medicinal; (2) vaccines and non-specific protein therapy; (3) physical methods; (4) other recent methods.

Forms of treatment of proved value in which no particular advance has occurred during the last few years are outside the scope of this paper, but may be mentioned here for the sake of completeness; they include the dietetic, spa and bath treatments, colonic therapy, orthopædic treatment and actinotherapy.

(1) *Medicinal methods* of treatment in the rheumatic disease group are largely analgesic in their aim. The majority of the attractive-looking samples which are received so frequently for trial are drugs of either the phenazone, cinchophen or barbituric acid groups, often blended with aspirin. This use of analgesics is, of course, justified, and the doctor who does not make the relief of his patient's pain his first objective is unlikely to have a chance of reaching any further objective. It must, however, be realized that the disease is likely to progress if remedial measures stop short at this point; this holds good more particularly in the articular groups of the disease. In the non-articular groups a gouty diathesis sometimes lies at the root of recurrent attacks, more especially if they are seasonal; in these cases colchicum, or one of the proprietary group of drugs of which atophan is best known, may be of value. It has been pointed out, however, by Willcox and others that these drugs, if abused, may give rise to dangerous results, of which necrosis of the liver is one. It is wise, therefore, to use atophan with the greatest caution. One method is to give it in doses of 7½ grains t.d.s. for three days only, leaving a gap of seven to ten days before any further dose is allowed. Aspirin is still perhaps the safest and most generally successful analgesic in rheumatic cases, although calcium acetylsalicylate has recently been recommended by Mutch,[4] as superior in that it does not disturb the digestion and gives off an appreciable amount of calcium in a form which can be utilized.

The question of the place of the *endrocrine* products in the treatment of these diseases is sometimes raised, and on this point there is not as yet final agreement. It seems that certain rheumatic conditions can be helped appreciably, but improvement only and not cure must be anticipated. Thyroid has little place in the non-articular group unless the patient is putting on weight. It is in the "climacteric" group in the early stages that it meets with greatest success. Some observers, however, believe that the best results are obtained even in these cases by the simultaneous administration of thyroid, pituitary and ovarian extracts, although the biological activity of the latter is not yet susceptible of definite proof.

Recently considerable attention has been paid to reports of the good results which have been obtained in the rheumatoid arthritic group of cases by means of certain salts of the heavy metals—more particularly gold—administered by injection.[2] The principle underlying this type of treatment is the same as that governing its employment in chronic tuberculosis, namely, the power of such salts to overcome chronic infection *in situ*. It must, however, be realized that in this group of remedies also there is considerable danger unless the dosage be small, the intervals between courses sufficiently long, and a careful supervision of the patient throughout practised. The initial dosage should seldom exceed 0·01 gm., and this may be increased gradually to a maximum of about 0·2 gm. Gold being a cumulative drug, the total amount administered during a course must be limited to about 1·5 gm., six to eight weeks' interval being allowed when this dosage has been reached. A second and even a third course may be given on these lines. On the Continent, where this method originated, considerably higher dosage is advocated, but my personal experience, which has been satisfactory, leads me to think the method suggested above the safer one.

Gold salts are definitely contra-indicated whenever there is reason to suspect renal or hepatic disease, and in debilitated persons whose powers of reaction are likely to be low. There are now several proprietary forms in which gold salts can be administered, notably allochrysine (Lumière), solganol B. (Schering), a solution in oil favouring very gradual absorption, and myocrisin (May and Baker). Recent work[6] seems to show that these salts are useless in the acute forms of rheumatic fever, and that their use should be confined to the rheumatoid group of cases.

The use of histamine has recently been advocated by Shanson and Eastwood[5] and others in this country following its use in 1931 by Deutch of Berlin. The method followed has been the subcutaneous injection of 0·1 mg. of histamine acid-phosphate diluted with saline. This dose is then increased daily by 0·05 mg. until definite improvement is observed. This course can be kept up for considerable periods of time since the drug appears to be harmless. The type of case most benefited, according to Shanson and Eastwood, is that with the co-existence of impaired grip, the result of peri-arthritis in the hand with vasomotor symptoms. In addition to the local improvement resulting almost immediately from the injections, a feeling of warmness and tingling throughout the whole body is felt, sometimes also with transient headache and flushing. The use of histamine by ionization will be described later, under physical methods.

Intramuscular injections of sulphur in oil have recently been advocated in the treatment of infective cases in the rheumatoid group. That these produce a leucocytosis and sometimes a mild pyrexial reaction is the basis of their use. I have seen little, if any, permanent benefit produced in this way, however.

It has been stated recently that the beneficial effects of " protein shock " therapy may be obtained, with all " shock " eliminated, by means of certain substances extracted from animal blood. If this method proves to be of real value, the whole question of the employment of such methods will have to be reviewed in the light of this advance in knowledge.

(2) In the matter of the *vaccine treatment* of rheumatism, it would seem that the disappointment originally felt by the rank and file of the profession in the results obtained by this method in their hands still persists. This was the natural reaction from the rather unwise claims made by some of the pioneers of this method, and few developments have occurred in more recent years to render the average doctor again "vaccine minded." The tendency would appear to-day to be towards considerably smaller dosage than previously, and the difficulties formerly met with when a patient got "sensitized" may now be partially overcome by suspending the vaccine in oil instead of saline, and so providing for much slower absorption by the tissues.

One of the most striking advances in the rheumatic field of medicine consists in the re-discovery, during the last few years, of the fact that the human body can be influenced equally from the outside as by internal (drug) methods of treatment. For these methods the term Physical Medicine has been coined.

(3) *Physical medicine* comprises the various methods of applying heat, movement, massage and rays of all sorts. The ways of producing these stimuli are legion, and the subject is one for special post-graduate study. This in the past, however, has generally been taken to imply that it was a subject which did not directly concern the general practitioner. Glover's[3] statement to the effect that every case of arthritis if properly treated would require physical treatment at some stage was, however, the cock-crow which announced the dawn of more enlightened thinking on this subject. The private doctor rightly laments the continual transfer to State Medicine of fields which were at one time his by right; here seems to be an extensive field in which no one at present will grudge him full scope. But it would seem that much of this field also will be lost to him shortly if he does not fully realize the poten-

tialities and indications of physical medicine as a legitimate branch of therapeutics and a sister to internal medicine. The influence of the unqualified practitioner, who often employs physical medicine also, is growing, and it is a healthy sign that many medical men are now enquiring into the *pros and cons* of the theory and technique of manipulative methods also. In the more technical realms of physical medicine, an advance must be noted which would appear to be of great importance—the introduction of short-wave diathermy. This wave, which is analogous to the wireless wave, eliminates those problems of surface resistance and selective heating of tissues which rob orthodox diathermy treatment of much of its value; a considerable additional advantage, both in convenience to the patient and in the time taken by treatment, is that, as the electrodes need not be applied to the skin surface, the patient need not undress.

The administration of acid histamine solutions by ionization through the skin was first introduced in Germany three years ago. Its effect on local rheumatic conditions is often very satisfactory and is no doubt due to the combination of the constant galvanic current employed with the "counter-irritating" effect of the drug which is apparent as a massive urticarial swelling in the site of application for several hours following treatment. The general therapeutic effects described above as following the injection of this substance subcutaneously are generally absent after this method of use.

(4) Of *other methods of treatment* employed with success in the treatment of rheumatic conditions, only brief mention will be made. The method of treating obstinate cases of rheumatoid arthritis by means of blood transfusion has been described previously[1] and I have employed it during the last 4½ years with success. The method is applicable to the type of case in which it seems impossible to stimulate the patient's

defensive mechanism by more ordinary means. It consists in giving a blood transfusion of 500 c.cm. and following this by physical treatment which will then be more readily tolerated than before. The transfusion must be repeated in a week's time. Two days later the patient should be got out of bed if possible and, if he is much under weight, should be put on to a diet rich in carbohydrates, and an injection of 15 units of insulin given about half an hour prior to a meal, once or twice a day for six weeks. By this means a good result may often be obtained in cases in which the prognosis would appear to be of the worst. Improvement, however, is seldom rapid, and the patient should be warned not to expect a dramatic result, as he probably will do on hearing the word " transfusion " mentioned.

Very recently the injection of oxygen has been recommended, by various routes, for the treatment of both articular and non-articular forms of this disease; but at present it seems uncertain that this treatment has any very definite beneficial effect.

In conclusion it may be emphasized that success in the treatment of this group of diseases is more likely to result from a correct *combination* of remedial methods than from the exclusive use of any method, however good. External and internal methods must be considered as complementary to each other, and the physique and reaction of the patient must be carefully studied, since it is particularly true in the case of debilitated patients of the rheumatoid type that over-treatment is as bad as under-treatment.

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MODERN METHODS OF TREATMENT IN ORTHOPÆDIC SURGERY

By R. WATSON JONES, B.Sc., M.Ch.Orth., F.R.C.S.

Honorary Orthopædic Surgeon, Liverpool Royal Infirmary, North Wales Sanatorium, Robert Jones and Agnes Hunt Orthopædic Hospital; Lecturer in Orthopædic Pathology and in Practical Surgery, Liverpool University.

THE history of surgery may be traced from the days of "laudable pus," through the phase of antiseptic surgery, to the age of aseptic surgery. It was not until operative surgical procedure was governed by the laws of asepsis that modern orthopædic surgery developed, for joints, tendon sheaths, nerves and the spinal cord are much less tolerant of infection than the abdomen with its protective peritoneum. But although orthopædic surgery depended on asepsis for its very existence, the principles of antisepsis have survived until recent years in the treatment of established infection of bones, joints and other tissues.

One of the most important advances in the realm of orthopædics has been the recognition of the inherent power of tissues to deal successfully with infection which is adequately drained. It has been clearly shown that repair is delayed and not accelerated by frequent dressings and by the application of strong antiseptics. Antiseptics may devitalize organisms, but they also destroy healthy young cells, and if to the tissue destruction of infection is added the tissue destruction of antiseptics, the volume of discharged pus is greatly increased and there is a corresponding increase in the degree of toxic absorption. Moreover, the daily removal of dressings for inspection of the wound is as useless and as harmful as the daily lifting of a bulb for inspection of its growth. The value of infrequent dressing may be seen in the modern treatment of varicose ulcers and of septic fingers.

THE WINNETT ORR NO-DRESSINGS TREATMENT OF OSTEOMYELITIS

During the last few years the principles of asepsis have been introduced into the treatment of acute infections of bone and joint.[9] Every effort is made to avoid secondary infection and no wound is ever dressed except in the operating theatre with the full ritual of aseptic technique. With such precautions the infected bone or joint is thoroughly drained and every abscess freely laid open. No antiseptics are used, but the recesses of the wound are lightly packed with gauze impregnated with a non-irritant emollient such as vaseline.* The whole of the skin of the limb is covered with vaseline gauze in order to protect it from the pus which will flow over its surface. A lightly padded plaster cast is then applied, including not only the infected area, but also the joints above and below. In this way meddlesome interference with the wound is completely prevented and there is no possibility of secondary infection. A firm even pressure is maintained so that the harmful influence of recurring œdema is prevented and excessive granulations are controlled. Although completely covered, the wound steadily heals, cavities fill from the bottom and the delicate epithelium rapidly grows over the granulations. The immobilization not only encourages repair, but it relieves the pain of movement of inflamed tissues and prevents the development of postural deformities and of pathological fracture. The necessity for daily dressings with their toll of suffering is entirely eliminated. The plaster is left undisturbed for at least four weeks and until the smell of the discharge which has accumulated between the vaseline and the plaster becomes too strong. The plaster and vaseline dressings are then changed under anæsthesia with full aseptic precautions. Three or four changes of plaster at four to six weekly intervals are usually required before healing is complete. Excess of pus escapes from the ends of the plaster, and neither this nor the smell need cause alarm.

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* Gauze is laid in layers in a watertight tin of convenient size (about 6″ × 4″ × 2″). Spoonfuls of vaseline are placed on top of the gauze, the lid replaced and the whole tin and contents sterilized. When the vaseline has melted it must just cover the gauze.

There is only one danger sign—a persistent rise of temperature, and in the absence of fever the surgeon may be satisfied that all is well. The temperature chart must be closely watched; the initial high fever should have subsided within four to five days of operation, and apart from a temporary reaction after each change of dressing, the temperature should remain steadily in the region of 99° F. On the other hand, a rise above 99° or 100° F. persisting for more than a day or two is conclusive evidence that an abscess is not draining freely. If there is no evidence of a secondary abscess elsewhere, the plaster must be removed under anæsthesia, the pocket of pus localized and drainage re-established.

OTHER APPLICATIONS OF THE WINNETT ORR NO-DRESSINGS METHOD

Although the advantages of this method of treatment of bone infection are so obvious, the no-dressings principle finds its least important application in the treatment of osteo-myelitis. The ability to immobilize a limb with a complete casing of plaster, with the knowledge that extensive granulating areas will continue to heal beneath the plaster has proved of the greatest value in many orthopædic conditions.

Burns and burn contractures.—The healing of severe burns in the region of joints is always complicated by the tendency to contracture of the healing area with the development of deformity of the joint. If the raw area is sufficiently extensive the application of splints presents the greatest difficulty; moreover, there is a continual tendency for the splints to become loose and slack, and very frequently the scar contracts despite every effort. On the other hand, if the joint is immobilized in the neutral position in plaster there is no longer any difficulty. The burn heals even more rapidly than by the older methods and the tendency to contracture no longer exists. If it is thought necessary, multiple Thiersch skin grafts may be applied, covered with vaseline gauze and plaster, and the grafts will survive and grow. If the burn has already healed and deformity of the joint is established, the Winnett Orr method is of great value, not only in the larger joints, such as the knee or elbow, but in the difficult cases where the fingers are involved. The contracted scar may be tenotomized, excised or lengthened, the deformity fully corrected and a plaster applied, even although raw uncovered surfaces are left exposed. There is no necessity for the more difficult methods of pedicle skin grafting; if the region is absolutely immobilized until epithelialization is complete so that there has been no single opportunity for the fibrous tissue to shorten, the resulting scar is equally soft and free from tendency to contracture.

"*The degloved hand.*"—The "degloved hand" in which every trace of skin has been torn away has always presented a difficult problem to the surgeon. It has been customary either to amputate such a limb, or to use complicated whole skin grafting methods. The application of splints to areas consisting entirely of raw bleeding granulations was quite impossible and deformities invariably appeared. Fig. 1 shows such a case with right-angled flexion deformity of the wrist. Although the fingers had been torn off, the thumb had survived the injury. Instead of amputating through the forearm as had been suggested, the deformity was corrected, the granulations skin grafted and a Winnett Orr plaster applied. A very useful limb resulted (Fig. 2).

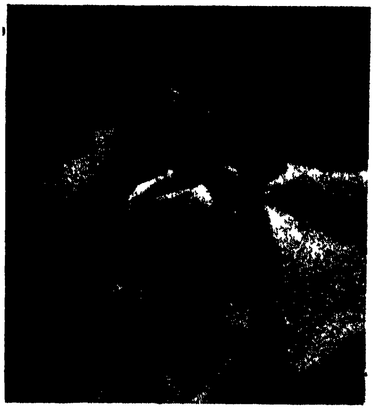

FIG. 1.—The skin of the hand and lower forearm had been torn away, together with all four fingers. The thumb is the only remaining digit. There is right-angled flexion deformity of the wrist. The granulations are infected with copious discharge of pus.

FIG. 2.—Same case as Fig. 1 after manipulative correction of deformity, multiple Thiersch skin grafts and Winnett Orr plaster. The "artificial limb" consists of a post against which the thumb can grasp large or small objects.

Fractures with severe skin injuries.—Very frequently fracture-dislocations of the foot or ankle joints are associated with severe abrasions and lacerations of the skin. It may be obvious that reduction of the displacement can only be maintained by plaster and yet the surgeon is afraid to adopt this method owing to the skin injuries. Hitherto it has been customary to defer reduction until the superficial wounds are healed, and, as a rule, by this time manipulative reduction is no longer possible. If the vaseline gauze method is adopted and the lacerations are not sutured, the application of a complete plaster is entirely safe and manipulation may be carried out at once.

Bed sores.—The combination of Thiersch skin grafts with a Winnett Orr plaster is a most excellent treatment for extensive pressure sores; bed sores many inches in diameter will recover more rapidly than by any method of antiseptic dressing.

This application is well illustrated by a recent case of a fracture of the shaft of the femur which had been treated by skeletal traction in a Thomas's splint. Large areas of the skin of the leg had been torn away and the wounds were infected. More than half the circumference of the limb was denuded and there was no possibility of utilizing skin extension. The pin track was already infected and the removal of the pin urgently indicated. The six weeks old fracture was quite un-united, and although skin extension was impossible and further skeletal extension unsafe, complete immobilization of the fragments was still necessary. There was a gluteal pressure-sore over two inches deep at the level of the ring of the Thomas's splint and the back was covered with large bed sores, the total raw septic area measuring over 30 square inches. The patient was extremely toxic, daily dressings of her wounds made life a torture, and almost everyone thought that she would die of toxæmia. How could such a case be treated? What means of immobilization could be employed which would also allow treatment of the many infected wounds and would permit of frequent turning of the patient to relieve pressure on the bed sores? The no-dressings method was utilized and a plaster spica applied. The general condition very rapidly improved, with the aid of skin grafts the pressure sores and the lacerations healed, and the fracture united without appreciable shortening or deformity.

Infected compound fractures.—When the fracture itself is compound and infected the same method may be used so long as the bone is freely drained. In the past the treatment of the infection has frequently been allowed to interfere with the immobilization of the fragments, and infected fractures failed to unite for this reason. Non-union is not the inevitable result of infection of a fracture, but is the result of the inadequate immobilization which has been permitted in such cases. By the Winnett Orr method the same plaster fixation necessary to control the position of the bone is required to control the infection. When this treatment is available the most severe laceration of the skin and the most gross infection of the fracture does not call for amputation, and are no excuse for deformity, shortening or non-union.

THE PRINCIPLES OF FRACTURE TREATMENT

During recent years a marked improvement has been observed in the treatment of all fractures. No longer is any degree of joint stiffness, bony thickening or deformity accepted as the inevitable sequel to a fracture, and the standard of success is estimated to-day not in terms of "a satisfactory recovery" or "a good functional result," but in terms of "a limb indistinguishable from the normal." This improved prognosis is attributable not to any revolutionary change in the principles of fracture treatment, but to the more careful and detailed application of principles which are already accepted.

(1) *Reduction of displacement.*—The necessity for "setting" has always been recognized, but modern treatment demands that this shall be an accurately controlled manipulation. Every manipulation must be followed by an immediate post-reduction X-ray through the plaster, and, if necessary, the manipulation is repeated two, three or more times until the position of the fragments is compatible with a perfect result. In the case of many fractures, check X-rays are taken at four- to six-weekly intervals throughout the period of immobilization.

(2) *Immobilization of the fragments.*—The use of splints for immobilization has been largely superseded by plaster, and plaster casts are now applied with minimal padding; in the majority of cases the cast is entirely unpadded and the plaster is in direct contact with the skin. This increased degree of immobilization minimizes the tendency to redisplacement of the fragments which was not uncommonly observed in the days when splints were used. Moreover, it is now recognized that non-union is almost always the result of imperfect immobilization, or of immobilization for too short a period.[7, 8] To-day no surgeon would immobilize a complete fracture of the wrist or elbow for less than four weeks, or a fracture of the shafts of long bones in adults for less than eight or ten weeks.

Fractures of the scaphoid and of the neck of the femur require still longer periods. Furthermore, it is clear that there is considerable individual variation, and in all fractures it is essential to continue immobilization until clinical tests show firm union, even although the anticipated period has been exceeded. It is entirely wrong to determine any specific number of weeks, and when it is found that a particular fracture has not conformed to the average to change the treatment and interrupt the immobilization by introducing massage, percussion and damming or operative methods. By these more rigid applications of the principle of immobilization the incidence of secondary deformity and of non-union has become almost negligible.

(3) *Functional activity.*—One of the most striking changes of recent years is the rapid disappearance of the masseuse from the field of traumatic surgery.[4] The practice of allowing joints to stiffen and muscles to waste while the fracture was uniting, and after removal of the splints of transferring the patient to a masseuse for completion of the treatment is now almost obsolete. The stiff joints, sluggish circulation, recurring swelling, and wasted muscles which it was expected the masseuse could cure are all avoidable complications. Functional activity is the third principle of fracture treatment, and it is not only equal in importance, but it must be instituted at the same time as the other two principles—reduction and immobilization. Every joint which need not be immobilized must be moved actively from the first day of treatment. Muscles which are entirely covered with plaster may be kept in normal tone and of normal size by active tonic contraction which does not involve approximation of the origin and insertion. The recurring œdema of the leg which always occurs after immobilization must be prevented by the application of an elastic dressing immediately the plaster is removed. The dressing does not interfere

with ordinary activity, and after five or six weeks of such active exercise the circulation becomes normal and the tendency to œdema disappears without any massage or electrotherapy.

The importance of excluding massage treatment lies not simply in the fact that the patient's own exercise is considerably more effective, but in the fact that passive movement and stretching of joints are definitely harmful. It is now well recognized that passive stretching of the elbow joint is the cause of myositis ossificans, and not infrequently is responsible for secondary nerve lesions. It is less clearly understood that passive movement of the elbow defeats its own object and actually causes increased stiffness and not increased mobility.[2] The rule which always applies to the elbow and finger joints, and sometimes to other joints, is that stiffness, whether due to trauma, adjacent infection or simple disuse, is aggravated by massage, by passive movements and, above all, by manipulation under anæsthesia.

THE MODERN TREATMENT OF SPECIFIC INJURIES

Modern orthopædic surgery has not only influenced the treatment of fractures in this general way. In certain injuries new operations and new appliances have been introduced which have entirely changed our views as to prognosis. Three examples may be discussed and the three which have been selected are those which in the past have accounted for the most serious permanent incapacity—crush fractures of the os calcis, fractures of the neck of the femur, and crush fractures of the spine.

Fractures of the os calcis.—Böhler has shown[1] that it is possible to reduce the displacement in cases of crush fracture of the os calcis by combining lateral compression of the fragments with traction to correct the upward displacement. The tibia traction apparatus which has been described[5], simplifies the reduction (Figs. 3 and 4). A pin is inserted above the os calcis and strong traction is produced. Unless the upward displacement is fully corrected the tendo Achillis remains slack and the patient always has difficulty in standing on tip toe, so that he is unable to walk with a normal heel and toe gait. The lateral spreading may be reduced by the pressure of the operator's fingers in recent cases, but in older cases Böhler's clamp or a Thomas's wrench is required. The limb remains in plaster for four months and weight-bearing is not permitted for three months. In many cases the sub-astragaloid joint surfaces are so badly comminuted that an arthrodesis of the joint is advisable, even although the fracture has been reduced. Wilson, of Boston, has advocated arthrodesis of the joint as a routine treatment for all os calcis fractures, but the results are very much better if manipulative reduction

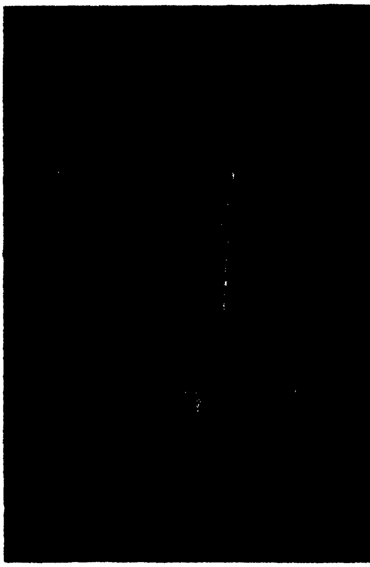

FIG. 3.—The writer's "tibia traction apparatus."

FIG. 4.—The apparatus in use for a case of crush fracture of the os calcis. The pin is inserted above the os calcis.

is practised as the routine treatment, and sub-astragaloid arthrodesis is reserved for those cases in which the joint is irreparably damaged.

Fracture of the neck of the femur.—Until recent years no fracture has been responsible for a greater proportion of cases of permanent crippling than high fracture of the neck of the femur. Almost invariably the fracture failed to unite and patients were condemned to pain, stiffness, instability and limping for the remainder of their days. The method of reduction and plaster immobilization described by Whitman improved the results very considerably, but surgeons were still faced with the difficulty that many of these patients were too old and too feeble to withstand the rigours of three or four months in a complete plaster spica, especially in view of the fact that many of the fractures still failed to unite, and that in many cases permanent stiffness of the knee resulted from the prolonged fixation.

The three-flanged stainless-steel nail described by Smith Peterson[10] has completely changed the prognosis in these cases. The nail is driven in from the trochanter along the line of the neck into the proximal fragment. With the nail accurately placed the fixation of the fragments is so perfect that there is no necessity for splints or plaster and the patient sits up and moves the knee and hip joints from the day of operation onwards. Moreover, the prevention of rotation movement of the fragments by the three flanges of the nail has so increased the degree of immobilization over any method previously described, that practically every case unites by bone. Old and fragile patients are much more able to withstand the shock of an operation under spinal anæsthesia than prolonged recumbency in plaster, and the method is applicable even in 70- and 80-year-old patients.

Attempts are being made to perfect a method of subcutaneous insertion by first driving in a wire guide and then using a nail with a central hole which is threaded over the guide. The main difficulty, however, is in determining exactly the correct position and the correct axis. The slightest deviation of the nail destroys the value of the procedure and, indeed, the result of treatment when the nail is inaccurately placed is likely to be inferior to that which may be secured by the Whitman method. Even when the joint is opened and the fracture exposed, the operation is one of unusual difficulty, and should not be attempted by any surgeon who is not regularly operating on the hip joint.

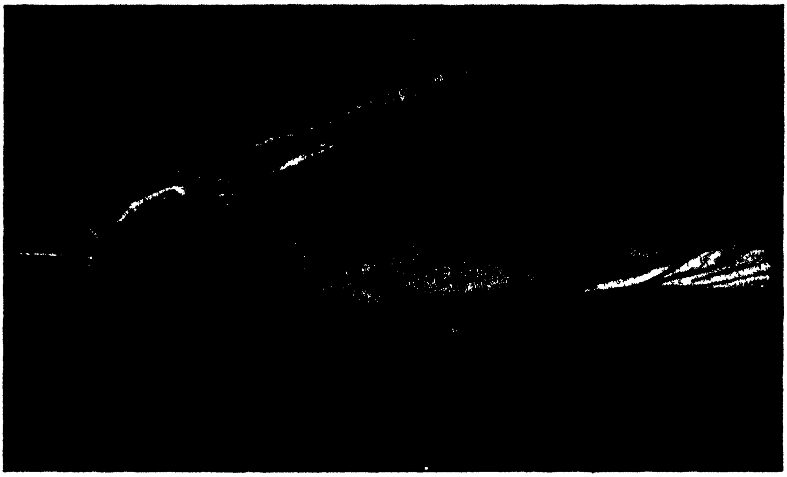

FIG. 5.—The author's method of manipulation reduction of crush fractures of the spine. (The shoulder sling and the roller towel beneath the feet add to the patient's comfort, but are not essential.)

Crush fractures of the spine.—Until recent years the accepted treatment of severe fractures of the vertebral bodies was to lay the patient in bed between sandbags, making no attempt to correct deformity or to alter the position of the spine. Four years ago the present writer described[3] a simple method of manipulative reduction by hyper-extension of the spine (Fig. 5). The patient lay prone between two tables and when the spine had gently sagged to the normal limit of hyper-extension a plaster jacket was applied (Fig. 6). The results of treatment in 80 cases were recently reviewed,[6] and it has been shown that however severe the degree

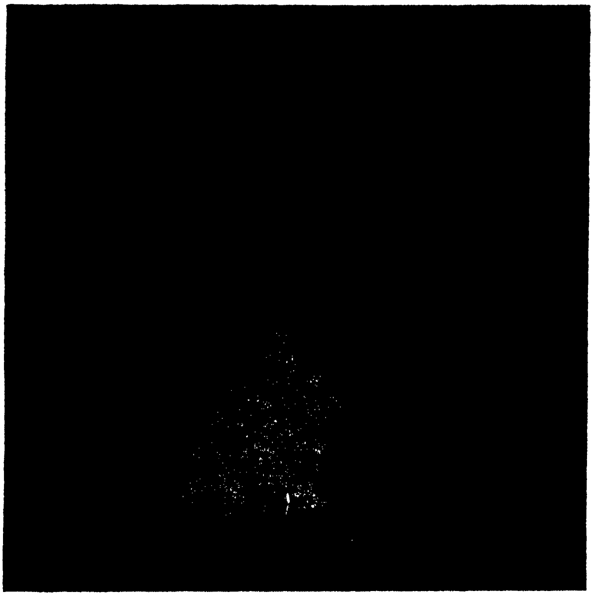

FIG. 6.—The completed plaster jacket in a case of crush fracture of the lumbar spine.

of displacement and however comminuted the fracture may be, the hyper-extension method is safe and effective. There is no necessity for any anæsthetic and the reduction may be carried out within a few hours of injury. In simple wedge compressions the duration of immobilization in the plaster jacket is four months, and when the vertebral body is comminuted, six months.

The same method of treatment is applicable in cases of fracture-dislocation with paraplegia. In such cases the paraplegia may be due on the one hand to transection of the cord, or on the other hand to simple contusion or compression. If the lesion is due to simple compression there is a reasonable prospect of recovery if the compression is relieved at once so that the area may re-vascularize. Continued compression and anæmia will convert a recoverable paraplegia into an irrecoverable one. It is obvious therefore that in every case immediate steps should be taken to relieve the pressure by reduction of the fracture and application of a plaster in hyper-extension. It is true that if the cord has been transected the paralysis cannot recover in any event, but even in such cases the treatment has greatly facilitated the problem of nursing, for the patient's pain is relieved, the shock is reduced, and he can be turned in comfort at regular intervals so that pressure sores are avoided. Laminectomy either early or late is a much less effective method of relieving pressure, and has been entirely superseded in the treatment of paraplegia from spinal fracture by the method of manipulative reduction.

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ADVANCES IN GYNÆCOLOGICAL TREATMENT

By WILFRED SHAW, M.A., M.D., B.CH., F.R.C.S., F.C.O.G.
Assistant Physician Accoucheur, St. Bartholomew's Hospital.

THE CONTRACTIONS OF THE UTERUS

RECENT experimental work on the ovarian and pituitary hormones has demonstrated that the mechanism which causes the uterine muscle to contract is one of very great complexity. It is well known that two principles have been extracted from the posterior lobe of the pituitary, one which stimulates uterine contractions—the oxytocic principle, while the other produces a rise in blood pressure. The two components are marketed in the preparations pitocin and pitressin. It has also been shown that the corpus luteum hormone, progestin, inhibits the action of pituitrin on the extirpated uterus of the guinea-pig. It might therefore be hoped that such clinical conditions as uterine inertia during labour could be efficiently treated by appropriate administration of the different hormones. The problem is, however, much more difficult. It must not be assumed that the effects produced in vivo are necessarily the same as those obtained in vitro. Again, there is some evidence that the human uterus does not respond in exactly the same way to oxytocic substances as does the uterus of lower animals. Further, the response of the uterus varies at different stages of pregnancy, and Knaus maintains that the response differs in the non-pregnant uterus according to the phase of the menstrual cycle. Even the claim of a clear distinction between vasopressor and oxytocic components of extracts of the posterior lobe of the pituitary has been challenged, for Chassar Moir has demonstrated that the vasopressor principle causes a spasm of the non-pregnant uterus.

It must be emphasized, therefore, that the exact scientific basis for the therapeutic use of pituitrin is not yet firmly established. The general principles are of course well recognized, for pituitrin has an obvious effect on the pregnant uterus, and this effect is best marked near term and during the puerperium. The relative insensitiveness of the gravid uterus in the early months of pregnancy to oxytocic substances explains the well known clinical difficulty of inducing abortion with drugs.

Perhaps the most brilliant piece of work carried out by a gynæcologist since the war is Chassar Moir's investigation of the preparations of ergot. Pharmacologists have been accustomed to regard ergotoxin, tyramine and histamine as the three active principles. Ergotamine probably differs but little from ergotoxin in its physiological effect. Both ergotoxin and ergotamine induce contraction of the uterus, but the effect cannot be detected in the human subject until fifteen minutes after injection. When given by mouth the action is uncertain. The controversy over the pharmacopœial preparations of ergot which was waged a few years ago will, perhaps, be remembered. It was shown that the liquid extract of ergot of the British Pharmacopœia contained little, if any, ergotoxin, with the result that the method of extraction has been modified in the new British Pharmacopœia so that the liquid extract now contains ergotoxin.

Chassar Moir used a method of recording contractions of the uterus which consisted in the introduction of a rubber bag within the uterus—a method similar to that employed by Bourne and Burn. The most important results were obtained with the puerperal uterus. Chassar Moir showed that the liquid extract of ergot contained a substance, different from ergotoxin or ergotamine, which induced contractions of the uterus within a few minutes of the administration of the old B.P. 1914 liquid extract by mouth. This substance is characterized by its rapid action and by its potency. Chassar Moir's work, above all, confirms the opinion of practitioners as to the efficacy of the liquid extract when given by mouth in the treatment of post partum hæmorrhage. Clinicians were very reluctant to admit that the liquid extract of ergot of the 1914 Pharmacopœia was inactive, for their experience was decidedly favourable, and there is clearly much to be said, in the light of modern knowledge, for the old-fashioned practice of the medical attendant giving the mother a drachm of the liquid extract of ergot after the completion of the third stage of labour.

Another important point, which again we owe to Chassar Moir, is that the uterine response to ergot is obtained when the liquid extract is given by the mouth. Further, it is probable that the Chassar Moir principle is the most important oxytocic component of ergot. It follows, therefore, that if practitioners wish to obtain immediate, effective and prolonged contractions of the uterus they cannot do better than administer liquid extract of ergot by the mouth. The effect of pituitrin and its oxytocic component is more rapid when the solution is injected intramuscularly, and if the patient is anæsthetized this method should clearly be chosen. It seems, however, that there will be a tendency to revert back to the routine administration of the liquid extract of ergot for cases of post partum hæmorrhage.

It is, perhaps, not sufficiently emphasized that the uterine bleedings of cases of fibroids, menopausal hæmorrhage and menorrhagia are different from those occurring post partum. In the latter, the blood is discharged into the cavity of the uterus from the sinuses of the placental site and normally these sinuses are occluded through the retraction of the surrounding muscle fibres. In the other forms of uterine bleeding the blood is discharged from the endometrium, the vessels of which are not controlled by the retraction of the uterine muscle fibres. It is, moreover, theoretically possible that oxytocic drugs may impede the venous return from the uterus, lead to congestion and so increase the uterine bleeding in these cases. Much cannot be hoped from the administration of oxytocic drugs in such cases. The most effective method of immediate control of this form of hæmorrhage is probably rest in bed. The indications for oxytocic drugs are on the whole obstetrical, particularly in abortion and post partum hæmorrhage.

PROLONGED FIRST STAGE: PRIMARY INERTIA

It is becoming generally recognized that cases of primary uterine inertia are more frequent nowadays than they were some years ago. In typical cases, labour may last from three to five days before the woman is delivered. In one group the pains are infrequent and poor, the membranes remain intact until the second stage of labour and, although there is always a tendency for the child to lie posteriorly, the prognosis to mother and child is good. In the other group the contractions are frequent and painful and perhaps because of this, the membranes are apt to rupture prematurely although the first stage is prolonged over many days. Signs of fœtal distress usually appear when the os is about three-quarters dilated, and if a forceps delivery is attempted great difficulty is encountered and the child is very often stillborn. The majority of women who develop primary uterine inertia are primiparæ; almost invariably they are fat and usually they are between the ages of 25 and 35. Little is known of the etiology except that in the worst cases there is well marked toxæmia with albuminuria and œdema. When the uterine contractions are painful and frequent, but ineffectual in causing dilatation of the os, the patient becomes extremely exhausted, for there is little response to hypnotics unless morphine is administered. Nembutal and avertin are of service to some degree but owing to the prolonged labour they must be repeated. In practice it is found necessary to administer repeated doses of morphine or omnopon to enable the woman to obtain rest and sleep.

The use of oxytocic drugs for cases of uterine inertia is theoretically correct, provided that care is taken to avoid overdosing and to ensure that the uterus is not supersensitive to such preparations. In practice, however, it is found that the results are indefinite. Two units of pituitrin is the maximum dose that should ever be employed during the first stage, although, of course, the injection can be repeated at frequent intervals. Although theoretically sound the treatment is far from being satisfactory. It should however always be tried in this type of case. Some gynæcologists have great faith in thymophysin, but again opinions differ as to its efficacy.

Clinically there is no difficulty in recognizing the condition. If the membranes have ruptured prematurely, if labour is greatly prolonged, and if the patient is much distressed there should be no hesitation in advising Cæsarian section. This implies that extreme care should be taken to avoid frequent vaginal examinations, and if such investigations are made efficient antiseptic precautions must be taken. The lower segment operation is clearly the method of choice. If the membranes are intact there is, as a general rule, no indication for such drastic treatment. A method which is sometimes of great help is to attach Willett's forceps to the child's scalp and to apply traction. Research is urgently needed to investigate the cause of primary uterine inertia. One cannot help feeling that simple remedies alone are necessary, for it is almost the rule for succeeding labours to be easy, so that the cause is unlikely to be an inherent defect in the uterus itself.

VAGINAL DISCHARGES: BIOLOGY OF THE VAGINA

The recent admirable work of Cruickshank and Sharman has done much to explain the biology of the normal vaginal secretion. They have shown that the glycogen content of the vaginal epithelium, the lactic acid acidity of the vaginal secretion and the dominance of Döderlein's bacillus in the vaginal flora are in direct proportion. It seems that Döderlein's bacillus ferments, either directly or indirectly, the glycogen liberated by the vaginal epithelium with the production of lactic acid. Extraneous organisms are probably unable to survive in this acid medium so that an infective vaginitis is prevented. Cruickshank and Sharman have shown that the glycogen content of the vaginal epithelium depends upon ovarian activity and is probably controlled by the hormone œstrin. Glycogen is found in the vaginal epithelium in plentiful amount during intra-uterine life, for a few days after birth and during the child-bearing period of life, but only scantily during childhood and after the menopause. Cruickshank and Sharman have suggested that the well known vaginal discharge, which consists of white coagulated material, results from over-activity of the glycogen-containing vaginal epithelium. Conversely, when the activity of this epithelium is low the vaginal acidity falls, foreign organisms infect the vagina and by producing a low grade vaginitis cause a leucorrhœal discharge. An important point to be emphasized is that many cases of leucorrhœa are due to a low grade vaginitis, the discharge arising not as previously supposed always from an endocervicitis but from a transudation through the vaginal epithelium. The leucorrhœa associated with infection of the vagina with the *Trichomonas vaginalis* has, of recent years, received considerable attention, for the thin yellow foamy discharge is characteristic and the peculiar red stippled appearance of the vaginal walls is easily recognized. The trichomonas, which is demonstrated in fresh hanging-drop preparations of the discharge, probably invades the vagina only when some constitutional disturbance arises which upsets the normal biological reactions of the vagina.

One of the most difficult problems with which the practitioner has to deal is to investigate and treat vaginal discharge. Such recent investigations as those of Cruickshank and Sharman, although contributing much to our knowledge of the physiology of the vaginal secretion, have illustrated that the leucorrhœal problem is much more complex than is generally believed. The history should be taken with care. In gonorrhœa, scalding micturition is a prominent symptom, the discharge may be described as greenish yellow and there is usually a history of severe vulvitis and may be of Bartholin's abscess. In trichomonas cases the discharge often develops during hot weather particularly after sea-bathing and is often first noticed at the conclusion of a menstrual period.

The diagnosis depends upon examination. A good light is essential and a bivalve Cusco's speculum is the most suitable instrument to use. Examine the vulva, vagina and cervix in turn. At the vulva, a urethritis or Bartholinitis are almost pathognomonic of gonorrhœa. Inflammation of the vulva, particularly of the inner surfaces of the labia may be found in leucorrhœa and gonorrhœa apart from such conditions as pruritus and diabetes. The vaginal contents can be examined as the speculum is being introduced. A thin watery yellow discharge is characteristic of vaginitis; thick white curds of the leucorrhœa due to overactivity of the vaginal epithelium as described by Cruickshank and Sharman. Frank pus is found with pyogenic infections and when mixed with mucus is pathognomonic of endocervicitis. The vaginal walls show red patches in senile vaginitis, while in the infective forms found during the child-bearing period of life the vagina is reddened diffusely, and minute red areas which bleed easily are scattered profusely over the vaginal walls, particularly in the region of the posterior fornix. Inspection of the cervix is of great importance, for if pus or muco-pus is seen to be discharging from the cervical canal a diagnosis of infection of the cervical canal can be safely made—such conditions as pyometra, septic endometritis of course being excluded. One type of leucorrhœa which is not fully understood is that caused by a profuse secretion of clear mucus, not contaminated with pus, either from the cervical canal or from a glandular erosion of the cervix.

The whole point of the above brief summary of the etiology and investigation of a case of vaginal discharge is to insist that there are many causes of leucorrhœal discharge. It is manifestly absurd to treat a vaginal leucorrhœa by applying antiseptics to the cervical canal just as it is useless to hope to cure endocervicitis by vaginal douches alone. For endocervicitis the accepted treatment is to swab the cervical canal with strong antiseptics such as iodized phenol and if this method fails to use diathermy. For ectropion and for glandular erosions, trachelorrhaphy is the only method likely to be successful.

With vaginal leucorrhœa, treatment must be both general and local. Attention must be paid to the general health in every case. Iron, aloes and tonics should be used when indicated and open-air exercises, games and gymnastic exercises encouraged. Local treatment depends essentially upon vaginal irrigations. An enamelled douche can should be used and the douche given with the patient lying in her bath, the only sequela which is directly attributable to the anæsthetic, or to the lumbar puncture, and is liable to occur, I think, especially in those nervous or irritable patients who are unduly restless or attempt to sit upright in bed during the first 24 hours after operation. Headache may also tend to occur in patients with a high pressure in the cerebrospinal fluid, so that leakage takes place into the tissues after withdrawal of the needle. The use of a fine needle is for this reason advisable when giving the spinal injection, a point recently emphasized by Allen.[3]

The advantages of operating with this anæsthesia are numerous, and some of these may be summarized as follows :—

(1) Rigid general preparation of the patient is not essential (particularly as regards the empty stomach required for general anæsthesia), and in dealing with urgent cases, such as large peri-anal or peri-rectal abscesses, immediate incision can be carried out.

(2) The complete anæsthesia and the relaxation of the sphincter muscles which are given by a low spinal anæsthetic allow a careful, adequate, and unhurried operation to be carried out. The proper laying open of abscesses is certainly one of the important ways of preventing the formation of fistulæ, and I know of no more unsatisfactory procedure than operating on a bad rectal abscess when the patient is coughing and straining or constantly moving back on the table under incomplete general anæsthesia; under these conditions the operator is very prone to cut too little or too deep. When doing a deliberate operation, however, under low spinal anæsthesia, the surgeon can make sure of defining and avoiding the external sphincter, and the unfortunate results due to its premature division are thereby avoided.

(3) The easy and painless administration of a low

spinal anæsthetic is well received by patients, and relieves the surgeon from any feeling of compunction in recommending operations in stages; this applies particularly to the treatment of fistulæ. Most of the bad cases of anal incontinence which occur are due to the operator's impatience or his desire to "complete the job in one sitting," which intent, if carried out, must sometimes, unhappily for the patient, be described as "one fell swoop." The cutting of the external sphincter when draining an abscess is bound to result in a varying degree of incontinence, and one of the greatest advances to be recorded here is the gradual awakening to this fact and the resignation of both patient and surgeon to multiple stage operations.

(4) Low spinal anæsthesia is eminently a safe procedure in advanced age and enables the surgeon to advise and carry out safely operations for many rectal conditions, both major and minor, which formerly the patient would probably have been obliged to endure for the rest of his existence. Thus large prolapsing piles may now be safely ligated, a contracted anal orifice enlarged, a fibrous polyp removed, or a rectal prolapse may be amputated. The absence of post-operative chest complications and of coughing, straining or vomiting, results in better healing with less anal congestion or œdema, and more rapid convalescence. Retention of urine is a fairly frequent cause of annoyance and anxiety both to patient and surgeon after any rectal operation, and at St. Mark's Hospital we do not consider that this trouble is any more frequent now than it used to be formerly when general anæsthesia was given to all the "short" rectal cases. In the case of elderly men with prostatic symptoms I have, however, so often met with urinary difficulty after low spinal anæsthesia that I prefer in these cases to operate under local anæsthesia (by which is meant the deep infiltration with novocaine of the anus and

external sphincter by Hirschman's technique). Many conditions, such as piles and polypi, can be efficiently dealt with by this method with distinctly less likelihood of upsetting the bladder function.

Looking back on the rectal operations of fifteen years ago, there is now in comparison a very marked improvement in the results, and this is due, I think, to the adoption of low spinal anæsthesia, to better operative technique and a more judicious selection of cases: the postponement of operations for hæmorrhoids until septic complications (ulceration or sloughing) have been relieved by expectant treatment is one example of the way in which the treatment of an important group of cases has been advanced.

PERI-RECTAL INFLAMMATORY CONDITIONS

The importance of early operation for acute peri-rectal abscesses cannot be over-estimated, both with the object of restoring the patient to health with as little delay as possible, and also in order to avoid the common sequela of neglect—the tracking of an abscess across the middle line or the formation of an internal opening into the rectum above the external sphincter. One particularly dangerous form of abscess is the deep post-rectal or ischio-rectal abscess which not uncommonly occurs in men who have previously been in good health. In these cases the early symptoms are chiefly of a general nature—fever and malaise with vague rectal discomfort. In the course of two or three days the rectal symptoms become more evident and, finally, deep peri-rectal induration is made out by passing a finger into the rectum, with the thumb externally palpating the intervening tissues. Infections of this type are liable to be caused by organisms such as *B. coli* and streptococci, which are capable of anærobic activity. If neglected these deep abscesses extend very quickly, sometimes with localized gangrene of the poorly nourished fat in the ischio-rectal fossa, and a high fever with severe toxæmia results.

The incision of abscesses of this type or of the more superficial anal or ischio-rectal abscesses is done in the same way: under low spinal anæsthesia the abscess is opened in a direction radiating from the anus to the extreme outer limit of the induration; another incision is made at right angles at the centre of the original incision, and then the four corners of skin and subcutaneous tissues are excised in such a way that an oval or circular opening is made into the abscess; no undermined skin is left, and the area of the wound should be the same as the area of the abscess. If an internal opening into the rectum is demonstrable it should never be laid open at this stage: a Λ-shaped corner of skin leading into the anal canal is with advantage removed, superficial to the sphincter, and a stout silk ligature is then passed through the internal opening from the depth of the abscess cavity; the ligature is knotted loosely round the sphincter and serves the following purposes:—(1) It marks the internal opening and keeps it defined for the necessary second stage operation. (2) The presence of the silk acts as an irritant to the external sphincter and promotes the formation of adhesions between the muscle and the margins of the granulating wound.

A second stage operation is done, often under local anæsthesia, two or three weeks later, and consists in the division of the tissue enclosed by the ligature, unless as a result of the continual slight traction on the ligature it has meanwhile cut out spontaneously. The smooth track leading into the rectum is thus opened up correctly and the ultimate result is usually perfect as regards sphincteric control. A depressed scar may be left leading into the anal canal, but this is inevitable, and the slight inconvenience therefrom can be minimized by careful attention to the toilet and by the use of a dusting powder.

In the treatment of fistula in ano the principles of incision and the providing of the necessary external drainage are well known and need no special comment in this article. The frequent necessity of a two- or even three-stage operation cannot be over-emphasized. If a track leading into the rectum is considered to pass deep to the external sphincter, whether beneath only a portion or the entire thickness of the muscle, it is often advisable to lay open the fistula externally and to tie a silk ligature loosely round the deep part of the track, pending a second stage operation (Fig. 1). No harm ever results from caution on these lines. A reference may be quoted here to a valuable paper by Allen and

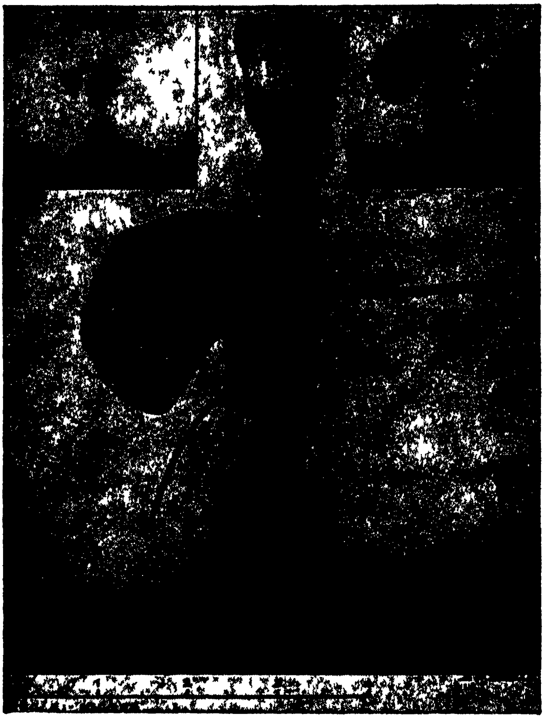

FIG. 1.—Shows operation for laying open a right anterior semi-horseshoe fistula· A director has been passed through the deep track leading into the bowel, and a stout silk ligature is in process of being tied loosely round the sphincter. The insets show the condition before and after operation.

Haskell[4] on the advantages of a two-stage operation for fistula in ano with the use of a silk ligature tied round the sphincter.

The treatment of wounds near the anus involves the use of antiseptics in watery solution. To those already in routine use, such as peroxide, sanitas, eusol and flavine, should be added another, namely, dettol. This is a new coal tar derivative with an antiseptic efficiency three times that of carbolic acid, a clinical report regarding which has been published by Leonard Colebrook.[5] In a dilution of 2 drachms to one pint of warm water I have found dettol a bland and effective antiseptic for irrigating purposes. For application as a moist compress to anal wounds a 2½ per cent. solution of dettol (½ oz. to 1 pint of water) can be strongly recommended. For instance, in a recent case a very large post-rectal abscess with gangrenous tissue cleared up with remarkable rapidity with dettol compresses, and a sluggish perineal wound after excision of the rectum for carcinoma improved immediately dettol irrigations and dressings were commenced; sloughs separated and a clean granulating surface quickly developed. The 2½ per cent. solution of dettol does not cause pain when applied to an anal or perineal wound, nor has it caused any skin irritation.

Under certain conditions the use of the diathermy current is advisable :—(1) For cauterizing the wound made by the laying open of a superficial tuberculous fistula (button electrode with coagulating current). (2) For incising an upward submucous track of a fistula (cutting current with a blunt knife electrode). (3) For enlarging the opening made into a submucous rectal abscess (button electrode with coagulating current).

In the conditions enumerated above diathermy is invaluable respectively (1) for cauterizing and sterilizing the wound; (2) for making an incision through mucous membrane without hæmorrhage; and (3) for making an aperture for drainage which is likely to heal slowly and thus give ample time for complete drainage and closure of the abscess cavity.

INJECTION METHODS OF TREATMENT

Sclerosing injections.—The treatment of internal piles by the submucous injection of sclerosing solutions is now a well recognized method. Of the numerous solutions which have been described, 5 per cent. phenol in almond oil is the one in general use and will produce good results in early cases of hæmorrhoids; bleeding is stopped immediately, and the early stages of prolapse corrected. It is only right, however, to point out that this method is not suitable in advanced cases of hæmorrhoids, and as a general rule operation should be urged in cases of large prolapsing piles, fibrous piles, or those complicated by external tags, fissures or fistulæ. The injection treatment of piles has passed through a period of intensive trial in the last seven or eight years, and, after much personal experience of it, my feeling is that a good deal of caution and discrimination should be exercised before beginning a course of injection treatment. If the piles have passed beyond the early stages injections may give relief, but this is likely to be temporary only, and the likelihood of recurrence of prolapse in a few years' time should be explained to the patient. To the busy individual this will often be good enough, and it is better policy to be modest in one's promises of relief rather than hold out extravagant expectations of cure.

Prolapse of the rectal mucosa (incomplete prolapse of the rectum) is a condition which is often amenable to treatment by multiple submucous injections of phenol in oil. The injections are begun as high up as possible, through a long tubular speculum; about 3 c.cm. of the solution are injected at each puncture, the points of injection being spaced round the rectal circumference where the laxity of the mucous membrane seems most marked: a total of 12 to 15 or more c.cm. of the phenol solution may be injected at one sitting with the object of producing a firm adhesion between the mucous and muscular coats. If the sphincter tone is impaired the patient should, as a regular exercise, carry out voluntary sphincter contractions which will soon improve the tone of the muscle when the prolapse no longer comes down.

The submucous injection of phenol in oil in much reduced doses is suitable also for the partial prolapse of children, or as an alternative there is the method of peri-rectal injection of absolute alcohol, 1·5 c.cm. on each side laterally, as described by Findlay.[6]

Anæsthetic solutions in oil.—The injection of anæsthetic solutions in oil is a valuable and well recognised procedure in certain cases of anal spasm, anal fissure and pruritus ani. Since the description of benacol by Yeomans[7] and his co-workers in 1927 many different solutions have been employed; they have usually been composed of anæsthesin (3 per cent.) or percaine (0·5 per cent.), with benzyl alcohol in varying concentrations in olive or almond oil; the object of the oil is to delay absorption and thus bring about a more prolonged anæsthetic action. It has been noted, however, that occasionally pain was complained of after the injections, and an improved solution has been evolved by Gorsch[8], which contains one eighth part of basic novocaine: this preparation has been termed "anucaine," and he reports it to be a great improvement by reason of more profound and prolonged anæsthesia. Working along the same lines in this country, Messrs. W. Martindale have produced a somewhat similar solution containing 1 per cent. of basic novocaine; this is now available in 5 c.cm. ampoules under the name sterules B.A.B.A.N. (Martindale).

After making a trial of this solution I have formed the opinion that the addition of novocaine is a distinct improvement; a more immediate effect is noted after its injection and also an excellent late anæsthetic effect is developed: pain after injection is usually absent.

Anal spasm and fissure.—The deep injection of 5 c.cm., sometimes 10 c.cm., of A.B.A. or B.A.B.A.N. into the external sphincter has proved of great value in cases of acute anal fissure, and also in cases in which troublesome spasm has developed after operative removal of other lesions such as piles and polypi. In dealing with acute anal fissures a preliminary injection with 1 per cent. aqueous novocaine solution is often helpful: this is injected from a posterior puncture, 10 c.cm. being injected into the sphincter on each side of the middle line; after waiting for a few minutes the B.A.B.A.N. is injected and finally the sphincter is gently stretched. Immediate relief of the spasm is given and as a rule, if a fissure is present, rapid healing takes place.

Pruritus ani.—Subcutaneous injections of the oil-soluble anæsthetics should not be given indiscriminately in cases of anal pruritus. The first thing required is a careful rectal examination, with proctoscopy and sigmoidoscopy; the majority of cases of pruritus will clear up with simple methods of local treatment, such as the regular use of soap and water, spirit lotions, and dusting powders; sometimes the shaving of long anal hairs assists the local treatment; sometimes there is an obvious exciting cause, such as thread-worms, fistula, fissure, or prolapsing piles. In a recent investigation, Scarborough[9] reports that 54 per cent. of rectal cases complained of irritation, and on examination some definite local cause was found in 151 out of 152 cases of anal pruritus.

If palliative treatment fails to relieve the irritation, and in the absence of any local cause, subcutaneous injections of A.B.A. or B.A.B.A.N. may be given; a few large injections are preferable to multiple small ones, and I have found that a total amount of 30 c.cm. given in three injections of 10 c.cm. at five to seven days' interval are well tolerated and will produce a diminution in sensation which is noticeable by the patient: the acute irritation is allayed and local treatment with lead, calamine, or magnesia lotion has a good chance of clearing up the anal dermatitis. These injections should not be given in the presence of an acute moist dermatitis, nor are injections likely to give good results if the pruritus extends forward to the vulva.

I must confess to being sceptical as to the value of X-ray treatment, and am of the opinion that pruritus ani is seldom a dermatological problem *ab initio*, except in certain cases: for instance, scabies may be the cause of the trouble, or examination may reveal an anal chancre or gonococcal proctitis; these cases will quickly clear up with appropriate treatment. In women the advisability of expert gynæcological examination is also frequently manifest.

Sometimes operative treatment is required for the most severe cases, especially if the oil-soluble anæsthetics have failed to give relief, or if relapse has occurred. Section of the perineal nerves is a sound operation, particularly in women whose anal irritation extends to the vulva. It has recently been suggested also that pre-sacral sympathectomy may give relief in these intractable cases.

PROLAPSE OF THE RECTUM

The treatment of severe degrees of complete prolapse of the rectum in adults has been, for many years, a debated problem, and the multifarious operations which have been described bear witness to the difficulty of curing these cases. No doubt in this condition, as in others, prevention is the ideal treatment, and if all patients with a slight degree of partial prolapse were to be efficiently treated by submucous injections the number of cases of complete prolapse or procidentia would be much reduced.

The last year has witnessed a return to favour in this country of the ancient operation of amputation of the prolapse (probably done first by Auffret[10] in 1882). This method was clearly described, together with details regarding the opening into the peritoneal cavity, by Sir Frederick Treves[11] in 1890, and a valuable paper entitled "The technique of resection for prolapse of the rectum" was published by Sheldon[12] in 1910; the latter author gives the following important directions for the operation:—(1) Make the incision in the mucosa not closer than ½ inch to the cutaneous anal margin; (2) include the meso-rectum in a mattress suture; (3) distribute the excess of the circumference of the lower segment equally between the sutures; (4) no pack or tube should be placed in the rectum.

W. Ernest Miles[13] showed two good results of the operation in 1913 and has recently further urged its usefulness with the title "recto-sigmoidectomy."[14] There is no doubt that the operation is a very good one for these advanced cases, and the profession is indebted to Ernest Miles for leading the revival and stimulating the practice of this operation. Anyone who has done the operation will agree that when the redundant pelvic colon is pulled down and finally sutured to the rectal cuff, a very satisfactory and neat result is given which offers little likelihood that the prolapse will recur. At the same time, the operation is one of some gravity when applied to elderly subjects. The co-operation of the patient in carrying out sphincter contractions subsequently is important.

STRICTURE OF THE RECTUM

The etiology of severe rectal strictures has been a debated one for many years. A century ago syphilis was considered to be the usual cause and, however accurate or not this view may then have been, it is certain that with the present efficient treatment of syphilis rectal strictures have now become rare in England. Tubercle, gonorrhœal infection and severe post-operative ulceration are also factors to be considered, and in recent years attention has been focused on another type of infection, namely, lymphogranuloma inguinale. This has been called the " fourth venereal disease," and diagnosis can now be established for certain by Frei's[15] test : this is in the nature of a skin reaction for which the specific antigen, usually derived from the brain or spinal cord of an infected monkey, is required. It has now been established that lymphogranuloma inguinale infection may result in severe rectal stricture, either as a result of lymph-stasis from involvement of the deep pelvic glands, or from the retrograde involvement of the rectal wall by the virus. Reference should be made here to the comprehensive papers on this question published by Cole[16] in 1933, and by Bloom[17] in 1934, with complete bibliographies, including a reference to the pioneer work of Jersild of Copenhagen. Bloom reports seven cases of rectal stricture which were under his observation in the years 1932–1933. All gave a positive Frei's reaction to several lymphogranuloma antigens, and as a result of treatment by tartar emetic or gold injections the general health and the local rectal affection were greatly improved in five cases followed up.

Another recent paper of importance to practitioners in this country is one by Earle[18] in which he describes a case of lymphogranuloma inguinale in a waiter, which was undoubtedly acquired in England. Earle considers that lymphogranuloma inguinale is definitely established in England, and it is evident therefore that this infection should be kept in mind and a Frei's test performed in all obscure cases of rectal stricture. In

Earle's case he reports the benefit obtained by a course of T.A.B. vaccine treatment.

CANCER OF THE RECTUM

The work which is being done on the subject of rectal cancer shows the paramount importance of early diagnosis in relation to expectation of cure. Owing to the natural capacity of the rectum and its insensitiveness, a neoplasm in the ampulla of the rectum frequently grows to a considerable size before the patient becomes aware of anything wrong. An early diagnosis is sometimes made by chance in the course of routine examination, and some patients may count themselves lucky if a growth makes itself felt in the early stages by reason of bleeding, rectal irritability, mucoid discharge or alteration in the regular habit of defæcation. The Annual Report of St. Mark's Hospital for 1933 shows that of 103 new cases of rectal cancer only 42 were operable; this is approximately 41 per cent. and is appreciably lower than the 47·5 per cent. and 48 per cent. operability rate of 1931 and 1932 respectively. I believe the reason for this decrease in operability rate may be partly an economic one—the working man with rectal symptoms tends to ignore his trouble and endeavours to carry on for as long as possible, knowing that any prolonged period of absence from work may prove a serious loss to him and his family.

Another important fact in relation to the successful treatment of rectal cancer is that approximately 50 per cent. of operable cases treated by radical operation have been proved to have metastases in in the rectal or superior hæmorrhoidal lymph nodes; this is a finding which has been confirmed by many different investigators and is a cogent reason for urging radical excision of the rectum in operable cases.

A radium implantation does occasionally bring about the disappearance of a rectal carcinoma.

CASE

The patient was a woman aged 61 with an operable sessile growth the size of a half-crown piece in the lower third of the rectum; fragments removed with Brünings' forceps proved the tumour to be a columnar-celled carcinoma. On account of the patient's stoutness and her poor state of health I treated this tumour by interstitial radium needling, by separate punctures through the vagina and from the perineum. (26 mgm. for 10 days in May, 1929.) The growth quickly retrogressed and the patient is now alive and well, more than five years later, with no digital or sigmoidoscopic evidence of recurrence; she has no colostomy.

A result such as this is, however, so rare that one hesitates to apply this treatment to the average operable case, knowing that in the past a radium implantation has usually led to a serious loss of time; an excision of the rectum has eventually been required in the majority of operable cases treated by radium, either for lack of response to the radium or for recurrence of the growth after an initial improvement. It is true also that occasionally some form of local excision may suffice to cure a very early rectal cancer—either a local excision may be done via the rectal lumen, or a sleeve resection of the rectum with circular rectorrhaphy—and if the cases are well selected the operator will "get away" with a good result in a fair proportion of these specially early cases. There is, however, an important and valid objection to local treatment of a rectal cancer (radium needling or local or conservative resection) namely, the frequent presence of adenomas in addition to the main tumour, and the fairly frequent occurrence of a double carcinoma in the rectum and pelvic colon (Fig. 2). Under these conditions the best and probably the only way to effect a successful result is by a combined abdomino-perineal excision. In selecting the operation to be performed the surgeon will be guided by his experience, by the height and extent of the growth, and by the condition of the patient.

A colostomy and perineal excision is a sound operation for some early cases where the likelihood of lymphatic spread is slight, and also for late cases in which direct spread has probably occurred through the rectal wall to such an extent that an already bad prognosis is not likely to be improved by an abdomino-perineal excision.

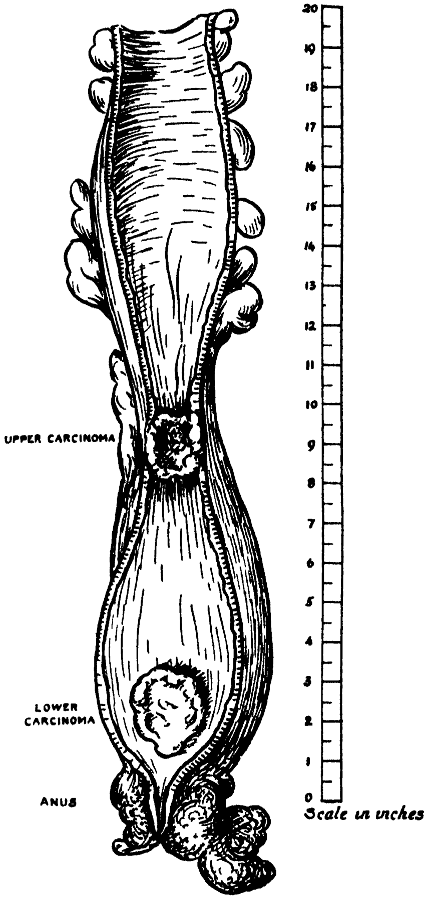

FIG. 2.—Scale drawing of specimen removed by perineo-abdominal excision, showing a double carcinoma; the lower one being situated in the ampulla of the rectum, the upper one in the recto-sigmoid region.

For the remainder, a group constituted by about 60 or 70 per cent. of the operable cases, a combined excision is advisable, with a view to (1) complete eradication of the disease in the "good risk" operable cases, (2) removal of a long length of bowel which may be the site of adenomas or multiple cancers, and (3) extensive removal of the zone of upward lymphatic spread.

There is no object here in discussing the technical details of the combined operations which may be performed. Success will result from good team work with careful and intelligent preparation and after-treatment. I do not know of any two-stage combined excision which is as good as a one-stage excision.

The orthodox Miles' abdomino-perineal excision may be done, or alternatively I would urge a trial of the one-stage perineo-abdominal excision which I have recently described;[19] this is a development from the two-stage operation originally described by Grey Turner,[20] and represents, I believe, a considerable advance in radical excision of the rectum. In perineo-abdominal excision the rectum and pelvic colon are excised in one stage, beginning at the perineum, either after a temporary laparotomy to confirm operability, or in some selected cases as a blind operation from below. This operation is undoubtedly a major one, but it is in some respects easier than the orthodox abdomino-perineal method; it seems to produce less shock and it avoids the risk of intraperitoneal sepsis, for there is no division of the colon until the end of the operation, when the bowel is divided outside the abdomen. The operation moreover seems to be borne well by patients who on account of age, stoutness, or general debility are far from being good subjects for a big operation.

An excellent paper is available by Janes and Murray[21] showing the possibility of shortening the period of healing after abdomino-perineal excision of the rectum. After the most careful hæmostasis of the perineal wound they brought the fatty tissues together by several layers of catgut sutures; a quarter-inch rubber tube was inserted and was removed on the second day. Two out of eight cases healed by primary union and three out of the eight patients left hospital in three weeks after operation with the wounds healed completely.

PRE-SACRAL SYMPATHECTOMY IN RECTAL WORK

Resection of the pre-sacral nerve or plexus is now an established operation. The anatomy, the function and the technique of resection of the pre-sacral nerve have recently been very clearly described by

Albert A. Davis[22] in a Hunterian Lecture, a study of which indicates that pre-sacral sympathectomy may be considered for the following conditions:—

(1) *Relief of pelvic pain.*—The pre-sacral nerve is a vaso-constrictor nerve to the pelvic organs, and it has been found that in certain painful conditions of the pelvis relief is afforded by resection of the nerve; this is probably due to the resulting vaso-dilatation; it does not appear as yet to have been decided whether the pre-sacral nerve has any actual sensory function. Pelvic pain from inoperable rectal cancer may be relieved by resecting the pre-sacral nerve, and the operation is specially indicated in those cases in which the growth is extensively involving the viscera anterior to the rectum, such as the urethra, prostate, vagina, or uterus. Pain from direct involvement of the sacrum or sacral nerves is not likely to be benefited. These facts indicate the value of exploring an inoperable rectal cancer through a median abdominal incision; apart from the complete examination which can thus be made, the surgeon will be able to resect the pre-sacral nerve as a palliative measure before proceeding to do a palliative colostomy.

(2) *Relief of bladder dysfunction.*—Davis states that "When the pre-sacral nerve—the sympathetic supply—is resected the sacral para-sympathetic system is allowed unchecked activity in performing its function as a detrusor of the uterus, just as it is of the bladder and rectum," and he reports that after pre-sacral sympathectomy he has noticed the striking way in which the bladder is emptied easily and frequently in the hours following operation and subsequently. This finding suggests that the surgeon may well consider resection of the pre-sacral nerve, not only in inoperable cases of rectal cancer, but also in operable cases, with the object of avoiding the post-operative retention of urine which almost invariably

occurs after excision of the rectum.

(3) *Relief of rectal dysfunction.*—Certain cases of obscure rectal pain with muscular spasm, particularly those cases with spasm and hypertrophy of the sphincter muscles and severe constipation, may be cured by resection of the pre-sacral nerve.

(4) *Pruritus.*—Davis states that several cases of pruritus of the vulva have been reported as cured by resection of the pre-sacral nerve. This may be due to interruption of the sympathetic supply to the sweat glands including the glands of Cowper and Bartholin, and the operation would appear to be specially worthy of trial in those severe cases of pruritus in women in which the irritation involves the vulva as well as the anal region.

INTRA-SPINAL INJECTION OF ALCOHOL

The treatment of pain resulting from the late extension of inoperable rectal cancers has always been a difficult one, and in advancing cases the giving of increasing doses of morphine has usually been the only effective measure. Yeomans[23] reports the use of absolute alcohol as an intra-spinal injection for the relief of pain. The alcohol being lighter than cerebro-spinal fluid, the patient is placed on the side opposite that most affected; the alcohol in a tuberculin syringe is injected very slowly, drop by drop, a total of from 0·2 to 1 c.cm. being given through one of the lumbar interspaces. The patient remains in the same position for 20 minutes and is then rolled onto his back where he rests for two hours. The injection may be repeated after an interval of days or weeks, according to the relief of pain afforded. Yeomans reports gratifying results in seven cases of malignancy presenting lower abdominal pain.

I have treated two cases by this method; in the first case a man with very severe pelvic pain from a large fixed rectal growth was completely freed from pain after intra-spinal injection of 1 c.cm. of absolute alcohol, to such an extent that all hypnotics were discontinued. A troublesome retention of urine, however, no doubt predisposed to by a prostatic enlargement, developed and a prolonged period of catheterization was required. Normal micturition was finally re-established eight weeks after the injection.

In the second case 0·5 c.cm. was given with the patient lying on his face in Hanes' position; a second injection of 0·75 c.cm. was given two weeks later, and a very notable improvement in his symptoms has taken place without any disturbance of the bladder function. In both of these cases a palliative colostomy had been established previously.

A NOTE ON INSTRUMENTS

The advantages of a sigmoidoscope with a proximal light are such that I have no hesitation in referring again to Yeomans' sigmoidoscope, which is illustrated in Fig. 3. This instrument has now been made in this country by Messrs. Vann Bros., the diagnostic tubes being made in alternative lengths of 8 and 10 inches. The shorter tube will reach past the recto-sigmoid junction and is effective in the average case. A very clear view of the mucous membrane is obtained and in the case of tumours I find it easier to obtain portions for biopsy or to apply diathermy treatment than with a sigmoidoscope illuminated by a distal light.

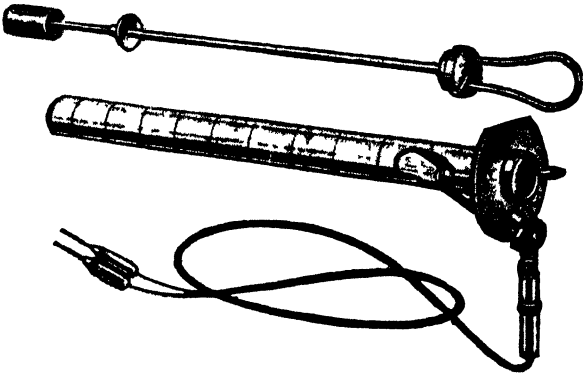

FIG. 3.—Yeomans' sigmoidoscope illuminated by a proximal light.

The application of a coagulating diathermy current to benign tumours of the rectum has been greatly facilitated by the diathermy forceps introduced by Frank M. Frankfeldt, of New York City (Fig. 4). With this instrument it is a simple matter to destroy a small sessile adenoma, or in the case of a pedunculated tumour the operator can either grasp the pedicle, if it is visible, and burn it through with the diathermy current until the polyp is pulled off, or he may grasp

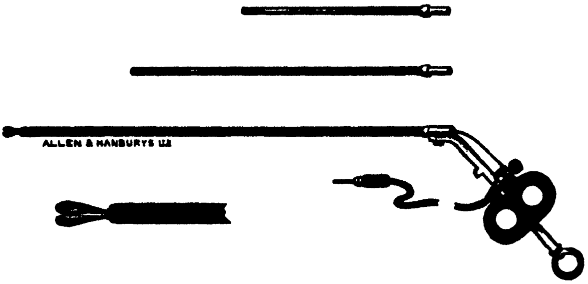

Fig. 4.—Frankfeldt's diathermy forceps.

the tumour itself and destroy it by coagulation until the base of the pedicle becomes visible, when it can be effectively cauterized.

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RECENT ADVANCES IN UROLOGICAL TREATMENT

By ALEX. E. ROCHE, M.A., M.D., M.Ch., F.R.C.S.

Assistant Genito-Urinary Surgeon, West London Hospital; Consulting Urologist, London County Council, and Teddington, Hampton Wick and District Memorial Hospital.

THE kaleidoscopic changes at present exhibited by urology, their multiplicity, and the bewildering rapidity with which the pattern shifts, make it rather difficult to differentiate between mere innovations and real advances. Receptivity to new ideas must be judiciously mingled with reluctance to abandon well tried methods; and, while conservatism must not be obstinate, the too common enthusiasm for the latest will-o-the-wisp needs restraint. Common sense and firm adherence to general principles may help to guide one to sound provisional judgments, the final and best arbiter, however, being time. Some of the more important of the methods recently introduced into urology are here briefly reviewed.

The *radium treatment of malignant disease*, which has achieved a well marked measure of success in the tongue, breast, and cervix, has on the whole given poor results in urology. Good effects have, indeed, followed the radium treatment of *carcinoma of the penis*, for early cases of which it may, perhaps, be regarded as the method of choice. But the disadvantages of radium treatment are that sloughing has resulted in many cases and that eradication of the disease is more doubtful than with amputation. The main advantage is the preservation of the penis. Since, however, its sexual functions have, as a rule, been largely fulfilled by the time carcinoma attacks it, retention of the penis seems to be rather a matter of sentiment, and not to be weighed against the greater chances of preserving life offered by amputation.

In *carcinoma of the bladder* irremovable by partial cystectomy the implantation of radium needles by open operation often lessens or arrests hæmorrhage and pain, and may delay the rate of progress of the disease. On the other hand, sloughing and increase of the patient's misery may be caused. Since the extent of a growth is better judged when it is exposed by open operation, *implantation of radon seeds through the cystoscope* is less scientific, and is further liable to the risk of calculous formation round seeds that may fall into, and remain in, the bladder cavity. Another disadvantage of radium treatment of carcinoma of the bladder is psychological, and due to the wide publicity given to the subject of cancer in the newspapers. As a result, the mention of the word radium enlightens the patient as to the diagnosis and induces depression. On the whole the radium treatment of bladder growths is a story of disappointment, for, though amelioration has resulted, it is difficult to speak of cure.

With regard to *carcinoma of the prostate*, the improvement of some cases by radium is offset by the general risk of spreading the disease, since implantation of radium involves making holes in the prostatic capsule which otherwise acts for some time as a limiting membrane. "When the expectation of life after a plain cystostomy is compared with that after radium treatment, my experience is that patients live longer after the former than after the latter" (Joly).

Deep X-ray therapy has proved of value, though limited, in carcinoma of the prostate; and it has the advantages over radium of avoiding an operation and of not making holes in the prostatic capsule. It is also of service as a post-operative measure after partial cystectomy and after nephrectomy for neoplasm. But, perhaps, the most striking effects of deep

X-ray therapy, as regards the genito-urinary organs, are in the treatment of malignant disease of the testicle, or rather of its secondary deposits in the abdomen or elsewhere. Radio-sensitivity is most marked in cases of seminoma (carcinoma), and metastases may, as it were, be made to melt away. But advances in the technique of radium and deep X-ray therapy must not blind one to the fact that, in the majority of cases, the help afforded in urological cases is palliative rather than curative.

With regard to other methods of dealing with some of the above conditions, the operative attack on *malignant disease of the testicle* has been enlarged by the introduction of the *radical operation*, the aim of which is the removal of the affected testicle and its lymphatic tract up to the renal vessels in one mass. In spite of recent diminution in the mortality of 12 per cent. found by Hinman in 77 collected cases, such an extensive operation, if properly performed, must involve a definitely higher mortality than simple orchidectomy. Probably most surgeons at present rely on a combination of orchidectomy and deep X-ray therapy. Time must elapse before it can be finally ascertained whether, in spite of its greater severity, the results of the radical operation, alone or combined with deep X-ray therapy, render this a preferable procedure.

Improved technique in the *implantation of ureters into the rectum or sigmoid colon* has recently brought to the fore *total cystectomy* for carcinoma of the bladder; and increased experience of this operation, and its division into two stages, have resulted in the survival of those otherwise doomed to a pitiful death. On the other hand, the high primary mortality of these large procedures, and the high late mortality from septic pyelo-nephritis, lend force to the argument of those who consider that, when a carcinoma of the bladder has progressed beyond the possibility of removal by partial cystectomy, it has, in the majority of cases, passed out of reach of cure by reasonable surgery. The improved methods of transplanting the ureters into the bowel have also brought new help to the treatment of other conditions, such as ectopia vesicæ and large vesico-vaginal fistulæ. In irremovable carcinoma of the bladder two palliative operations have recently been performed with the object of relieving severe pain. Of these, *pre-sacral neurectomy* (*sympathectomy*) has the double advantage of being the less severe and of being practicable through the same incision as that exposing the bladder. The other, chordotomy, in which the antero-lateral (spino-thalamic) tracts are divided, has the advantage of being more certain in its effect; but has the disadvantages of greater severity, the need for a separate operation (laminectomy), and interference with sensation from other parts. The performance of neurectomy seems reasonable when the inoperability of a bladder growth has been discovered only after its surgical exposure. When, however, this has been determined clinically and cystoscopically, the justifiability of abdominal section, in order to mitigate pain in a patient who is soon to die, seems debatable.

Pre-sacral neurectomy has also been employed with some success in *paralysis of the bladder* due to relative overaction of the sympathetic nerve-supply to the internal sphincter, with consequently incomplete emptying. But incontinence is recorded as a possible sequel to this operation.

Sympathectomy has also been recently introduced *for renal pain* the origin of which is left obscure even after full urological investigation (nephralgia). It is suggested that " overaction of the sympathetic nervous system on the musculature of the renal pelvis, calyces and ureter impedes their movements and makes them difficult, induces increased intra-pelvic and intracalycal tension, and causes pain. Renal sympathectomy removes this impediment, with resultant lowering of tension and relief of pain " (Harris and Harris). In the diagnosis of such renal sympathetico-tonus these authors state the essentials to be absence of ureteric stricture or other organic lesion, normal findings on microscopical and bacteriological examination of the urine, delayed pelvi-calycal emptying, recurrence of pain after temporary relief by eserine, and its production during ascending pyelography. In such cases, " with the exception of a positive pain-reproduction test, delay in emptying of the pyelographic medium, and possibly slight clubbing of the renal calyces and dilatation of the pelvis, essential normal renal findings were the rule " (Harris and Harris). Since delay in emptying the renal pelvis, if long continued, must result in renal dilatation, such cases probably represent early stages of hydronephrosis. In fact, the same authors state that " the above is the presumptive explanation of the origin of many cases of hydronephrosis which occur without evident cause." Logically enough, renal sympathectomy has been performed for hydronephrosis.

With regard to renal sympathectomy for actual hydronephrosis, I do not know of any large series of cases performed with a high proportion of permanently satisfactory results. Indeed it might be supposed that in time the divided nerves would grow again, and that this operation, though often resulting in temporary improvement, would in many cases ultimately lead to the sequel of so many plastic operations for hydronephrosis—namely, secondary nephrectomy.

As regards renal sympathectomy for nephralgia when the pyelogram is normal or nearly so, it seems desirable to perform this operation only in very carefully selected cases. There must be absolute certainty of the renal source of the pain, and the other diagnostic desiderata of the sympathetico-tonic syndrome must be fulfilled. Even then, as the treatment of severe recurrent headaches without discoverable organic basis is not surgical, the invocation of surgery, when pain happens to be renal, calls for caution. Renal sympathectomy seems justifiable, and a welcome alternative to nephrectomy in cases in which, before the introduction of sympathectomy, the severity of the pain would have called for nephrectomy. I have never performed or seen nephrectomy for renal pain, in the absence of a definite organic lesion, and it seems reasonable that renal sympathectomy for such pain should be correspondingly rare.

The flood of new *urinary antiseptics* remains in full spate, but the search for the ideal one continues although, if the fulsome eulogies which accompany each new product could be believed, the need for further search would seem unnecessary. Many of the urinary antiseptics in popular use have been shown to be valueless, their apparent effects being probably attributable to the *vis medicatrix Naturæ.* The credulous should study the discussion on this subject by the Sections of Urology, Pathology, and Therapeutics and Pharmacology of the Royal Society of Medicine, and a later discussion on the same subject by the Urological Section of the American Medical Association. At the latter meeting the openers of the discussion concluded that, "In the treatment of infections of the urinary tract, the time has not yet arrived when the old reliable methods, based on detailed investigation and elimination of the accessory or underlying causes, may be discarded in favour of indiscriminate medication." In the ensuing discussion there was much agreement with one speaker's statement that "the best urinary antiseptic is water, and plenty of it"; the opinion was even expressed that urinary antiseptics have done more harm than good by encouraging those who believe in them to waste valuable time which would be better employed in urological investigation. Similar criticism is applicable to treatment of urinary infections with the *B. coli* by means of the *ketogenic diet.* The last two patients referred to me for investigation, who had had this treatment, were found to have respectively an infected hydronephrosis and carcinoma of the bladder with cystitis. In chronic or recurrent urinary infections thorough investigation will nearly always discover some organic lesion responsible for the continuance or recurrence of infection. The attempt to treat such an infection without first excluding causes which will maintain it is doomed to failure, and fair neither to patient nor treatment. The ketogenic diet is rich in fats, and its use has apparently achieved good results in suitable cases. Its disadvantages are that is it very distasteful, often inducing nausea or vomiting, and that its correct employment necessitates institutional supervision. It can hardly be expected that the surgeon should be qualified to pass judgment on the relative merits of the ketogenic diet and of various antiseptics in the treatment of urinary infections; he is largely occupied in discovering, and if possible removing, mechanical lesions which hinder recovery, whatever is poured down the patient's throat. It is rather the difficult task of physician and bacteriologist to assess the comparative values of ketonuria and of antiseptic drugs by limiting their systematic employment to cases in which a surgical basis for continued infection has been excluded or is irremovable, and to resist the temptation to employ those methods in unsuitable cases—that is to say, cases uninvestigated save for the discovery of chronic or recurring pyuria and bacilluria.

Recent instrumental additions to the urological armamentarium include the cystolithotrite, delicate catheters for the ejaculatory ducts, and improved electrical apparatus for per-urethral resection of the prostate.

The *cystolithotrite* combines cystoscopy with lithotrity, and is theoretically attractive in enabling vesical stones to be crushed under vision, and not blindly as with the lithotrite alone. Yet ordinary litholapaxy is a good operation in practised hands, and, whereas no reputable firm will sell a lithotrite which has not been tested on material much harder than the hardest bladder stone, the weakening of the crushing part of the instrument by the incorporation of the optical portion involves a greater risk of breakage of the instrument during operation; this serious accident has occurred even with the ordinary lithotrite, unweakened by incorporation of a cystoscope.

Catheterization of the ejaculatory ducts enables vesiculograms to be taken, and allows lavage of the vesicles, or the application of antiseptics to them, to be carried out. These advantages, however, are offset by the rarity of the indications for vesiculography (except for those who cannot resist the fascination of pretty pictures, even when not essential), and by the fact that vesiculitis usually subsides under ordinary methods of treatment.

Per-urethral operations for prostatic obstruction have recently received a new lease of life as a result of instrumental improvements. An electric current runs through a wire loop, which is passed over the prostatic projection, the loop, on withdrawal, cutting away a strip of the prostate. Several such strips can be cut. The improvements of the modern method; as contrasted with previous per-urethral operations, consist in the removal of the detached pieces (thus lessening sepsis) and in the possibility of achieving hæmostasis by coagulation. This is not the minor operation that some descriptions of it might suggest;

and the same attention to the function of the kidneys is necessary with per-urethral as with open methods of operation. Final judgment between the two is at present impossible. "McCarthy says the prostate is at the cross-road, but Ockerblad believes it is the urologists who are at the cross-road and the fog is dense" (Cunningham). Until this clears, it is reasonable to follow the tendency of conservative urologists to reserve the per-urethral approach for small enlargements of the middle lobe of the prostate and for fibrotic conditions of the region of the bladder neck. The general practitioner should not allow himself to be unduly influenced by records of large series of cases treated with low or no mortality by per-urethral methods. The reports show that enthusiastic "per-urethralists" are operating on many patients of 40 to 50 years of age, a decade when enlargement of the prostate gland is very rare, and when, in the absence of residual urine, conservative surgeons would not advise any operation at all. Also in this as in all branches of surgery there are many other causes of divergent mortality-statistics in different series. The fact that A's published mortality-figures are 2 per cent., and B's 4, does not necessarily mean that A is twice as good a surgeon as B; it may mean that B is twice as honest as A.

With regard to *suprapubic prostatectomy*, Harris of Australia has recently elaborated a technique which, it is claimed, allows *primary suprapubic closure* to be safely performed. This is a highly desirable aim, as it lessens the patient's discomfort and shortens convalescence. But it means that, since reliance for drainage must be placed solely on the indwelling urethral catheter, hæmostasis must be of a high degree. Since, in the majority of prostatectomies, this is far from being the case, and since, should the bladder have been closed, secondary suprapubic drainage might become necessary, it would seem that, for the average operator, primary suprapubic drainage by a large tube is the safest policy. Harris acknowledges this for, referring to his own technique, he concludes that " the operation is decidedly not one for the occasional prostatectomist."

With regard to the *incompletely descended testicle,* recent series of cases treated by *orchidopexy* show much better results than were formerly obtained, and indicate that anatomical success is attainable in about three-quarters of the cases. For various reasons it is much more difficult to be sure of physiological success. However, in the absence of any definite evidence whether or not scrotal orchidopexy can confer the function of spermatogensis on an otherwise sterile testicle, it is, to quote Tyrrell-Gray, " unlikely that testes apparently normal in every way should prove ultimately to be defective in this one respect."

Injection methods of treatment, which have achieved brilliant results in varicosis of the legs, have recently been applied, with a fair measure of success, to *varicocele, hydrocele, and spermatocele.* Quinine-urethane and sodium morrhuate solutions have been commonly employed, and it is agreed that large varicoceles are those suitable for injection. The technique needs much care. The advantages of injection over open operation are that the patient is not confined to bed and that the lumen of the spermatic artery is not endangered. The risk of subsequent atrophy of the testicle should, therefore, be less. On the other hand, open operation would appear to offer greater precision in choosing the veins to be sclerosed, and protection against the risk of obliterating too many of them. Before undertaking injection of the so-called idiopathic hydrocele, care is necessary to exclude underlying and causal tuberculosis, syphilis, or neoplasm. Injection is unsuitable for hydroceles with thick walls, for those communicating with the peritoneal cavity, and for those associated with a hernia.

The results suggest that injection methods, carefully employed in suitable cases, offer a valuable alternative to open operation which, however, remains unassailable in combining applicability to all cases with certainty of result.

This article is not intended to suggest the pessimistic view that the so-called recent advances in urological treatment are mythical, but to demonstrate the need for tempering enthusiasm with judgment. The difficult tasks of discriminating what is likely to be of permanent value from what is only of temporary or academic interest, and of accurately assessing the relative worth of different forms of treatment are almost beyond the power of any individual. Indulgence is therefore claimed for the present attempt to steer a safe passage through the new and doubtful currents of urology.

CONCLUSIONS

Recent advances in urological treatment include implantation of radium for carcinoma of penis, bladder, and prostate; deep X-ray therapy in malignant disease of testis and prostate; the radical operation for testicular neoplasm; increased scope for total cystectomy by improved methods of transplanting the ureters into the bowel; pre-sacral neurectomy and chordotomy for the severe pain of irremovable vesical carcinoma ; renal sympathectomy for nephralgia and hydronephrosis; new urinary antiseptics; ketogenic diet for urinary infections; cystolithotrity, catheterization of ejaculatory ducts, and improved technique in per-urethral operations on the prostate; suprapubic prostatectomy with primary closure of the bladder; good results of orchidopexy; and injection treatment for hydrocele, spermatocele, and varicocele. It is, however, difficult to be certain how far innovations constitute real advances.

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TREATMENT IN SOME MINOR SURGICAL PROBLEMS

By JOHN B. HUNTER, *M.C.*, M.Ch., F.R.C.S.
Surgeon, King's College Hospital and the Royal Chest Hospital.

MINOR surgery from the practitioner's point of view is chiefly concerned with the treatment of inflammatory lesions, which may be among the most difficult surgical problems. In some cases the life of the patient may depend on their proper management, in others the full use of a hand, and in all the necessity of returning the patient at the earliest possible moment to full economic activity. The discussion of recent advances in this subject is mainly a statement of the principles on which treatment must to-day be based, together with details of the methods which experience has shown to be most adequate.

THE SEPTIC HAND

In taking this as the first problem I do so not only from its frequency but from its importance, and also because the principles applied here apply in great part to all septic skin or subcutaneous foci. Everyone is familiar with the small raised lesion on the back of the hand or lower part of the forearm, which starts with great irritation, and in twenty-four hours has become a raised tender red area, with apparently no abrasion over it. A few hours later the patient begins to complain of throbbing pain, with a possible lymphangitis and some tenderness in the axilla or over the epitrochlear gland. The swelling now shows a small area of dead skin over its most prominent part, and on removing this with a pair of dressing forceps a small hole may be seen with a yellow slough at the bottom.

At this stage incision into the area is absolutely contra-indicated, as is any severe pressure applied to the part in an attempt to squeeze out pus. Both these measures may determine a widespread cellulitis, or a spread of the infection to the blood-stream. Complete rest to the area, with frequent hot fomentations, is the correct treatment; at the same time the lesion should be dressed frequently by gently removing the dried lymph from the opening with dressing forceps and allowing the exudate to drain. With these measures it will be found that in a few days the original opening is much larger, the slough begins to liquefy and the inflammatory reaction is localized. At the end of eight to ten days the slough will have come out or been removed by the dressing forceps, leaving a hole which will rapidly close. In some cases the constitutional disturbance will be so great that additional measures will have to be undertaken, such as the injection of serum (10 c.cm. anti-staphylococcal) on two succeeding days, and I would emphasize this general treatment before any incision is made in the local lesion.

It will be seen that in treating this condition every attempt is made to localize the inflammation, and that having been done, the local process is carefully watched, and there is the minimum of interference. This applies generally to all septic lesions, as hasty and intemperate measures may only give rise to a blood infection.

WHITLOW

In this condition there are the same underlying factors, but the inflammatory state is complicated by anatomical considerations which make the management of the case more difficult, and, in a large number of cases, call for active surgical procedures. The inflammations starting round the cuticle of the nail, in most instances, require only rest and treatment with heat; but when the inflammation has spread under the nail, it is essential that the whole or part of the nail should be removed. It is not always easy to determine whether the inflammation is subcutaneous or deep; but if the nail is looked at in profile, it will be seen that when the pus is deep to the nail the whole nail bed is raised to the general line of swelling, whereas when it is subcutaneous the nail has its normal contour line and disappears into the general swelling. In cases in which an incision has to be made into a subcutaneous swelling in this situation, its line should follow the line of the nail, its two ends incised in a proximal direction so as to form a flap, and a small piece of rubber glove inserted under the flap to keep the wound open, thus allowing for drainage; the subsequent treatment being with hot fomentations, and either saline or iodine baths.

When the infection is in the pulp of the finger and requires opening, the incision should be taken round the apex of the finger, and the pulp turned back in the form of a flap—an incision should never be made vertically into the pulp. When making the incision, or when removing a nail for nail-bed infection, care should be taken not to go too deeply, as the terminal phalanx may be injured, determining a necrosis of the bone which would not otherwise have occurred. If the terminal phalanx is already necrosed the pulp flap can be increased in size and the dead bone removed.

In cases in which the infection is situated in the other segments of the finger or has spread from the terminal segment there is grave risk of it involving the flexor sheath, with sloughing of the tendon from pressure, or adhesions forming in the sheath with grave consequences. In such cases it is necessary to deal with the mechanical problems of inflammation rather than the infection itself, and the chief consideration is the relief of tension by incisions, so placed as to give the maximum relief to the pressure with the minimum disturbance. This is done by lateral incision either on one or both sides of the finger, the incisions being placed between the flexor creases. When pus is already in the sheath the latter should be opened through similar incisions on both sides, and the wound drained with a rubber-glove drain. A rubber tube should never be used, owing to the risk of pressure on the tendon.

The spread of infection in the tendon sheath may occur sometimes before the patient has consulted his practitioner, and again, insidiously, after incisions have already been made in the finger. In the case of the thumb and little finger the spread may be rapid, involving the palm and forearm at an early stage, but in the case of the middle three fingers the forearm will not be involved till the sheaths have given way at their proximal ends, and the infection has spread to the palmar fascial space and so to the forearm. Infection of the palm requires definitely placed incisions to open up the proper fascial spaces. In the case of the thenar space an incision should be made in the back of the hand to the outer side of the metacarpal of the index finger; this is the only dorsal incision that is ever required for sepsis from the digits, however swollen the dorsum of the hand may be.

In the case of the hypothenar space the incision should be over the hypothenar eminence, and where the infection has spread from the middle three fingers an incision should be made through the web of the finger, and should extend to a point midway between the distal and central palmar creases. Drainage in such cases should be maintained by rubber-glove drains, and not by rubber tubes. Subsequent immediate treatment will necessitate constant hyperæmic measures with hot fomentations and baths, and complete rest to the part. It should be borne in mind that few infections of the fingers can be treated lightly, and, when an operation is necessary, it should be done with a proper anæsthetic, in which I include gas; it should never be undertaken by such local anæsthetics as ethyl chloride, which not only temporarily destroys the local resistance, but does not allow an adequate operation to be done.

Spreading cellulitis of the forearm and involvement of the glands, both the epitrochlear and axillary, may be associated with the finger infection. In such cases the need for active surgical measures is not so urgent. The inflammation should be treated on expectant lines with hot fomentations, and when pus has formed the appropriate incisions made. If interference is undertaken too soon the incisions merely discharge lymph for a day or two, and continue as slightly purulently discharging wounds for a considerable time without materially affecting the patient's condition, except from the added discomfort and exhaustion of daily dressings. When the axillary glands are affected an abscess may form, and fill the axilla; frequently it tracks up under the pectoralis major, and pus in this situation may not be diagnosed for some days.

CARBUNCLE

The true carbuncle can be a greater source of worry to the general practitioner than almost any other inflammatory state; starting insidiously, it is usually treated domestically, until it has reached alarming proportions, and often the patient and friends consider it too lightly until the patient is seriously ill. Its commonest site is in the neck or back, although it may occur in any situation. The patient, usually considerably debilitated, is commonly elderly, and in a large number of cases there is some sugar in the urine. This does not mean that the patient is a diabetic, but is an indication of a renal " tip over " in the presence of a severe septic condition. When sugar is present investigations must be made, and, if the patient is a true diabetic, appropriately treated. The local treatment is expectant. Rest is essential, with hot applications if no pus is being discharged. If pus is being discharged, the hot fomentations can be continued, or a dressing of magnesium sulphate paste can be applied. This produces an active flow of lymph, and helps to liquefy the slough; it is usually a painful dressing, but the pain is greatly relieved if powdered aspirin is added. When the carbuncle is situated in the dense tissue of the neck and back it is necessary in severe cases, and when the condition has been localized by the previous treatment, to make a crucial incision, turn up the four flaps so formed, and remove the underlying slough with a scalpel; the cavity thus formed is filled with flavin-paraffin gauze. The flaps retain their vitality, except for the extreme corners, and the time of convalescence is greatly reduced. When the carbuncle is in a more vascular region—such as the upper lip or cheek—active surgical interference should not be undertaken, as the risk of a septic thrombus spreading into the cavernous sinus is very great, and may be determined by an incision. These cases should be treated by very frequent and efficient fomenting and daily dressing with forceps to remove crusts and small sloughs. Usually in about a week the inflammation is dying down, and the sloughs begin to come away with the dressing, leaving a clean granulating surface.

ABSCESS OF THE BREAST

This inflammatory manifestation is frequently met with—perhaps more commonly in hospital than in individual practice. It occurs during the early period of lactation, and manifests itself as a painful firm area in a sector of the breast running up to the nipple. The patient usually has a slight temperature and some malaise. At this stage, by active and efficient emptying of the breast with a pump and applications of heat, the condition may settle down; if it progresses the breast becomes so tender that the breast pump can scarcely be tolerated, and the constitutional symptoms are marked; it is advisable, at this stage, to wean the baby, and treat the patient with saline purges. The local condition will necessitate operation if persistent œdema is present; an incision should be made over the area of maximum tenderness and a gloved finger introduced, any pockets are opened up, and at least one counter incision made, and more if thought necessary. Tube drainage is instituted; for the first three days this is best done by through and through tubes, as otherwise single tubes may be extruded, and either inefficient drainage result, or great pain caused to the patient by insertion of fresh tubes. The opposite breast should be kept emptied by the breast pump, and the affected breast treated with very frequent hot fomentations. The involution of the breast, produced by light diet and purging, greatly assists the subsidence of the inflammatory process, and it is surprising how quickly the breast resumes its normal contour and how little scarring is left.

ABSCESS IN THE NECK

A large number of abscesses in the neck are tuberculous in origin, arising from tuberculous glands, and a much smaller proportion are due to acute infection of the lymphatic glands from septic tonsils or teeth. The really acute abscess gives rise to little difficulty in diagnosis, and drainage should be effected as soon as pus is thought to be present. But in the type of tuberculous gland which breaks down rapidly and produces a collection of pus that may be mistaken for an acute abscess, opening of the abscess is clearly not indicated. Usually diagnosis can be made by the constitutional signs, as these are never marked in a tuberculous condition.

Tuberculous abscess in the neck can be sometimes treated with repeated aspiration through a healthy area of skin, but this method is rarely successful unless it is accompanied by complete rest for the part, which can only be attained by the head being constantly rested on a pillow. This last is very much a treatment of perfection, and few patients can be made to carry it out; the usual consequence is that the abscess points and bursts, leaving a sinus. The treatment of such a condition should not be undertaken lightly. The scraping of the sinus with a sharp spoon will produce no result other than disappointment to patient and doctor, and the only satisfactory method is adequate removal of the affected glands.

RECENT ADVANCES IN THE SERUM TREATMENT OF DISEASE

By G. F. PETRIE, M.D.

Head of the Serum Department, Lister Institute, Elstree, Herts.

THE purpose of the following account is to illustrate the progress made during recent years in the prophylaxis and treatment of disease by the employment of therapeutic sera.

THE CONTROL AND STANDARDIZATION OF THERAPEUTIC SERA

An important step was taken when the control of all serum preparations used in this country was vested in the Minister of Health, who exercises it in accordance with the provisions of the Therapeutic Substances Act of 1925 with the co-operation of the Medical Research Council. The regulations of this Act prescribe the standards of potency and purity to which therapeutic sera must conform before they are released for issue. The Biological Standards Department of the Medical Research Council co-operates with an International Commission in promoting the adoption of an appropriate unit of potency for sera that are being more widely used at the present time, such as anti-pneumococcus serum, staphylococcus antitoxin, and gas-gangrene antitoxin; a " unit " is the specific activity contained in an arbitrary but definite weight of a dry stable preparation of each of the standard sera. The value of work on the standardization of sera is beyond question, first, because it helps to ensure that the patient will receive an adequate dose of the remedy and, secondly, because the clinical results that are obtained in those countries where the standards prevail are rendered comparable. The physician, the patient, and the specialist who is responsible for the preparation of sera cannot fail to profit by the application of accurate methods for estimating the potency of these remedies.

MODES OF ADMINISTRATION OF THERAPEUTIC SERA

Clinical and laboratory evidence has proved that for its effective use the serum should be given at the earliest possible moment. The experience accumulated during the War furnishes an apposite illustration of the importance of the time factor for it showed that the prophylactic use of tetanus antitoxin is a measure of undoubted value and gives results much superior to those obtained by its use as a curative agent. The delay of an hour in the treatment of a patient with commencing tetanus may turn the scales against the chance of recovery. A single suitable dose given at the first opportunity for the treatment of a toxæmic disease, such as diphtheria, is preferable to a number of smaller doses distributed over the period of the illness. On the other hand, patients suffering from an illness in which invasion of the infective agent is the dominant feature require repeated doses of the serum in order to maintain the concentration of the specific antibody in the tissues and thus to check the progress of the infection. Pneumonia and cerebrospinal fever should be treated, therefore, by means of daily doses until improvement sets in; even when the meningococci are no longer recognizable in the cerebrospinal fluid it is well to give two or three additional doses of the serum so that the risk of a relapse may be lessened. The great importance of early diagnosis in patients who are suffering from a disease which may be favourably influenced by specific serum therapy is not sufficiently appreciated. Many lives would be saved if more attention were paid to early diagnosis and prompt administration of serum in the following diseases: diphtheria, tetanus, cerebrospinal fever, and dysenteric infections of bacterial origin.

The rate of absorption of the antibody depends upon the route of administration; the order in terms of an increasing degree of efficiency is as follows:—the subcutaneous, the intramuscular, the intraperitoneal, and the intravenous route. If the patient is gravely ill and has reached a late stage of the illness the serum should be injected directly into a vein. The risks inherent in this method and the precautionary measures for obviating them need not be detailed here, but it may be recalled that absolute prohibition of the introduction of serum by the intravenous and, indeed, by any route is confined to the case of the person who is highly sensitive to emanations from horses and who is probably a carrier of an hereditary allergic factor. Deaths from serum accidents are rare, and the risk to life by failing to inject the serum into a vein so that it may be immediately available for the tissues that are susceptible to its curative action should be weighed against the risk which attaches to the method of administration.

The propriety of giving the serum as a routine measure by the intravenous route at an early stage of the disease even when the symptoms are mild is still in dispute; the intention is to prevent the onset of severe symptoms and of complications and to shorten the period of the illness. Bie in Copenhagen and Banks[1] in this country have carried out systematic investigations in order to determine the utility of large intravenous doses of antitoxin in diphtheria; these workers are convinced that the results obtained are excellent. In a recent account Banks has summarized his procedure as follows:—When the symptoms are mild the patient receives an intramuscular dose of 2,000–8,000 units; when the toxæmia is slight an intravenous dose of 8,000–20,000 units is given; when the toxæmic symptoms are severe an intramuscular dose of 8,000 units is given immediately after admission and this is followed one hour later by a single massive intravenous dose which is selected from a scale that ranges from 20,000 to 150,000 units and which is proportional to the severity of the toxæmia. He also refers to the group of patients who, when admitted, are so overwhelmed by the toxæmia that even large doses of antitoxin are ineffective. A similar policy has given equally good results in the treatment of scarlet fever. Information that Dr. Banks has kindly put at my disposal provides an interesting comparison between (*a*) a group of 794 patients treated by the intravenous route with scarlet fever antitoxin, and (*b*) a group of 1,003 patients who did not receive antitoxin. The fatality rate in the intravenous group was 0·12 per cent. and in the control group 0·8 per cent.; the complication rate in the intravenous group was 13·4 per cent. as compared with 28·1 per cent. in the control group; and the average duration of residence in the hospital was 18·9 days in the intravenous group and 35·4 days in the control group.

The intravenous method is especially indicated for the specific treatment of diseases, such as lobar pneumonia, the pyogenic infections, anthrax and plague, in which the infective agent tends to overflow into the bloodstream from the primary focus.

THE USE OF SERA IN SOME BACTERIAL AND VIRAL DISEASES

Consideration may now be given to those infective diseases in which specific serum treatment has been employed in recent years with results that give promise of aiding the recovery of the patient.

Anti-pneumococcus serum.—The work of investigators in the United States during the past ten years, both in the laboratory and in hospital wards, has greatly advanced our knowledge of the specific serum therapy of lobar pneumonia. Observations made in Aberdeen, Edinburgh, Glasgow and London have confirmed the value of this method of treatment in Type I and Type II pneumonia. The clinical results obtained at these centres have been condensed in a valuable Report by the Therapeutic Trials Committee of the Medical Research Council.[5] The physicians who collaborated in the investigation were agreed that the appropriate type-specific serum, particularly when given very early, frequently produced striking benefit. The fatality rate in Type I and Type II pneumonia was reduced in the age group 20–40 years but remained unaffected in the group 40–60 years. The treatment shortened the febrile period in those patients who recovered; it was thought, too, that the serum decreased the liability to empyema among them. A dose of 20,000 units of the specific serum was given intravenously as soon as possible after the sputum had been typed. Further doses of 20,000 units were administered at eight-hourly intervals up to a total dosage of 50,000–120,000 units. Patients who were infected with Type II pneumococcus required more vigorous treatment than Type I patients. Slow administration of the serum and the subcutaneous injection of half or one cubic centimetre of adrenaline solution (1 in 1,000), if allergic symptoms appeared, rendered the technique a safe one.

Anti-meningococcus serum.—The recrudescence of cerebrospinal fever in England within the past few years stimulated interest in the use of the specific serum, and prompted the inquiry that is being conducted by the Ministry of Health into the clinical results that follow its use. The serum is capable of reducing the fatality rate from 70 to 30 per cent.; but it must be admitted that, especially in some European countries, the treatment seems at times to have been inefficacious. It is not yet fully understood how the therapeutic effects are produced; an antibacterial element is probably an essential component of the serum and an anti-endotoxin may also play a part. Ferry[3] and his co-workers[4] in the United States have lately described experiments indicating that an antitoxic serum can be prepared in the horse, which saves the life of animals when these are infected with living meningococci. This work is of much interest and it is to be hoped that it will conduce to improvements in the preparation of the specific serum.

Staphylococcus antitoxin. — The immunological characters and particularly the toxin of *Staphylococcus aureus* have been known for many years and it is surprising, therefore, that until quite recently few attempts had been made to prepare a specific antitoxin. The tragic occurrence at Bundaberg in Australia in 1928 was the starting-point for further investigations and researches are now being carried on in various laboratories in this country and in North America with the object of producing a satisfactory antitoxic serum. Clinical experience is too small as yet to enable a definite conclusion to be formed, but it is certain that owing to renewed interest in the subject sera will be produced with an adequate titre as estimated in terms of a standard unit. It will then be possible to make comparable clinical observations and thus to ascertain the value of the serum as a means of treatment in the various forms of staphylococcal infections.

Gas-gangrene antitoxin. — The occurrence of gas gangrene as a complication of wounds during the War gave an impulse to researches into the toxins and the corresponding antitoxins of members of the gas-gangrene group of bacilli, and particularly *B. welchii.* Increasing knowledge of the specific toxins and antitoxins of this group of anærobes will doubtless contribute to the preparation of a multivalent antitoxic serum which will be of value in the prevention and treatment of anærobic infections. Some clinical observers are of the opinion that a *B. welchii* antitoxin relieves the toxæmic symptoms which accompany such abdominal conditions as acute intestinal obstruction, advanced peritonitis, gangrenous appendicitis and puerperal infections of anærobic origin. Work on the standardization of the various antitoxins is proceeding, and the antitoxin for *B. welchii* infections is now titrated in terms of a standard unit both in this country and the United States.

The prophylaxis of measles. — A survey of the numerous publications on this subject reveals a notable unanimity of opinion upon the efficacy of human immune-serum in preventing or mitigating an attack of measles in susceptible persons who have been exposed to the infection. Normal adult serum may be used as a prophylactic but it is only about one-half as effective as " convalescent " serum. The dose of " convalescent " serum necessary for complete protection is from 5 to 12 c.cm., the amount depending upon the age of the recipient; the serum should be given not later than five days after the date of exposure to the infection; the immunity thus conferred is a transient one. Mitigation of the symptoms with the production of a permanent immunity can be arranged for by delaying the administration of the serum to a late stage of the incubation period, that is, the sixth or seventh day after exposure to the infection. Immune-serum from patients who are convalescent from measles is believed to be devoid of curative value, when it is given after the onset of the symptoms.

Anti-poliomyelitis serum. — The present position of the treatment of poliomyelitis by means of human antiviral serum is not altogether secure, if we may judge from the contradictory opinions of those who have had experience of its use. But there is evidence that " convalescent " human serum, and even the serum of many normal persons, contains a substance—a specific antibody—which, when mixed with the causal virus and injected into the brain of a susceptible monkey, is capable of preventing a fatal infection. For the treatment of the disease in man the serum should be administered by the intrathecal route in the pre-paralytic stage of the illness, and supplementary intravenous doses may be given. The variable and comparatively weak content of the antiviral substance in human immune-serum has caused researches to be made into the production of a specific serum by the method of hyper-immunizing horses. Work in this country by Fairbrother and Morgan[2] and also in the United States has shown that potent sera can be prepared in this way; unfortunately, however, the serum is apt to give rise to considerable reactions in patients when it is administered intrathecally. Nevertheless, an antiviral serum from the horse is likely to be serviceable as a prophylactic agent, should outbreaks of the disease occur; its employment for this purpose by the subcutaneous or intramuscular route may be regarded as a perfectly safe procedure.

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Further details and full lists of references will be found in "Recent Advances in Vaccine and Serum Therapy," by A. Fleming and G. F. Petrie, published by J. & A. Churchill, 1934.

RECENT ADVANCES IN VACCINE THERAPY

By ALEXANDER FLEMING, F.R.C.S.,
Professor of Bacteriology and Assistant Director, Inoculation Department, St. Mary's Hospital.

IN the early days of vaccine therapy, research was largely directed to the extension of the method to different infections, and innumerable papers appeared showing that almost all bacterial diseases could be prevented or have their course modified by the use of vaccines. In recent years more attention has been paid to the quality of the vaccine and especially to the state of the microbial strain or strains from which the vaccine is made. Intensive researches have been carried out on the different antigens which are present in bacteria and extremely interesting and valuable results have emerged.

Flagellated organisms like the typhoid bacillus have been shown to have in their flagella an antigen which is quite distinct from those contained in the body of the bacillus, and it is this flagellar antigen (or as it is commonly known in the laboratory, the H antigen) and its corresponding antibody which are responsible for the floccular agglutination which is observed in the ordinary performance of the Widal reaction. This flagellar antigen has, however, been shown to have no power of evoking a protective response when injected into animals, and a typhoid vaccine in which the whole of the flagellar antigen has been destroyed is just as powerful a protective agent as one which is rich in flagellar antigen. It would appear that in bacteria of this type the whole of the protective antigen is contained in the body of the bacillus.

"R" AND "S" VARIATION

There is a tendency for bacteria in the course of prolonged subculture outside the body, to lose virulence and, as Arkwright and others have shown, this change during prolonged subculture is accompanied by profound changes in the characters of the bacterium. The normally virulent " Smooth " or " S " state of the organism changes to the " Rough " or " R " form and this transition is accompanied by changes in the appearance of the bacterial colony, by changes in the stability of the bacterial suspensions, and by changes in the antigenic structure of the organism. In vaccine therapy we are concerned especially with the antigenic change. In the body of the typhoid bacillus in the normal " S " phase there is an antigen which when used as a vaccine confers a very marked degree of protection against infection. As the bacillus degenerates to the " R " phase this antigen is lost and a vaccine made of " R " typhoid cultures is without protective value. Incidentally during the " R " degeneration the antigen contained in the flagella of the typhoid bacillus does not alter; the change is entirely in the somatic antigens.

In 1932 Grinnell in the United States investigated the properties of a number of strains of typhoid bacilli which he obtained from laboratories which were manufacturing typhoid vaccine. The strains investigated were all of the well known " Rawlings " culture which had been isolated by Wright at Netley about the beginning of this century and which was used by Wright and Leishman in the preparation of the vaccine in the early days of anti-typhoid inoculation. Grinnell's conclusions can be summed up very shortly: he found that all the strains of typhoid bacilli had undergone variation to a greater or less extent so that vaccines made from them were incapable of protecting animals against infection although a vaccine made from a recently isolated typhoid culture gave good protection. It follows from this work that much of the typhoid vaccine made in the United States in recent years was ineffective and there can be little doubt that had Wright, Leishman and their co-workers used such old degenerate cultures in the early days of anti-typhoid inoculation the great value of this procedure would have been overlooked. Grinnell's work has been confirmed in England by Marrian Perry, Findlay and Bensted, and it is of interest that these workers have succeeded in rejuvenating the old Rawlings strain so that it now makes a very efficient protective vaccine.

It seems likely that the failure in the past to recognize the importance of "R" variation of cultures has militated against the general acceptance of prophylactic inoculation against whooping cough. Whooping cough resembles typhoid fever in that an attack of the disease confers a considerable degree of immunity and as it has been clearly established that anti-typhoid inoculation is a valuable procedure, it is not unreasonable to assume that anti-pertussis inoculation with an efficient vaccine should likewise be valuable. Most workers have until recently had some difficulty in isolating *B. pertussis*, so that the stock vaccines were for the most part made from old laboratory cultures, and it has been shown by Leslie and Gardner that these old cultures had degenerated and vaccines made from them were without protective value. The result of this has been that in this country very conflicting results have been obtained by different workers in the prevention and treatment of whooping cough by vaccines. In Denmark Madsen, who used vaccines made from freshly isolated cultures, has published figures showing that the administration of a vaccine confers a considerable degree of protection against an attack and, further, that in the inoculated individuals the disease, if it does occur, is very much less severe. As a result of these researches stock whooping cough vaccines made to-day should only be made from strains of *B. pertussis* freshly isolated or preserved in such a way that their antigenic capacity remains intact.

PROTECTION BY VACCINES OF SPECIALLY VIRULENT STRAINS OF BACTERIA

To yet another antigen contained in the body of the microbe have protective properties been ascribed. Day[1] in 1933 showed that streptococci whose virulence had been highly exalted contained an antigen which protected mice against infection with virulent streptococci, whereas the same strain of streptococcus whose virulence had not been raised apparently contained no such antigen. In July last Felix and Pitt[2] demonstrated that extremely virulent typhoid bacilli contain in their bodies an antigen distinct from the smooth somatic " O " antigen and that a vaccine made from the virulent bacilli confers on animals protection against the virulent bacilli, whereas a vaccine made from a less virulent strain does not confer protection against the virulent strain. It is not yet quite clear whether this newer knowledge will affect the practical problem of the preparation of typhoid or other vaccines, but it seems quite likely that as a result of these researches an anti-typhoid vaccine will be produced even more effective than that which has in the past produced such good results.

PLAGUE BACILLUS ANTIGENS

Schutze's work on this subject may have a considerable bearing on the results of prophylactic inoculation against plague. Anti-plague inoculation has chiefly been carried out in India and the vaccine employed has in the main been made in the manner recommended by Haffkine, namely, old broth cultures grown at a temperature of 26° to 30° C. Schutze has shown that although *B. pestis* grows luxuriantly at 26° C. a vaccine made from such cultures confers little or no protection, whereas if the cultures were grown at 37° C. the growth was less luxuriant but each bacillus had developed around itself an envelope.

He found that it was in this envelope that the protective antigen lay so that vaccines made from bacilli grown at 37° C. conferred a marked protection on animals. It may be, therefore, that if the authorities in India prepare their vaccines from cultures grown at the higher temperature the results of anti-plague inoculation will be materially improved.

ACTIVE IMMUNIZATION WITH TOXOIDS

In the strict sense a bacterial vaccine may be said to be a standardized suspension of bacteria, but in the wider sense it includes all microbial antigens whether contained in the bodies of the organisms or set free into the culture medium. It has long been known that bacterial exotoxins were antigenic, and this has been the basis of the preparation of antitoxic sera. More recently, however, it has been demonstrated that when toxins were acted on by formalin they were changed so that they lost their toxic but retained their antigenic powers. These altered toxins have been called " toxoids " or " anatoxins." The discovery of the action of formalin on toxin has been of great service in the production of antitoxic sera and it has opened up a new field in the prophylaxis of human disease. So far it has been mainly exploited in diphtheria prophylaxis, and by the general use of toxoid in young children it seems possible that diphtheria can be eradicated from a community. So much, however, has been written on this subject that it is unnecessary to refer to it at greater length.

Tetanus toxoid can be used in the same way as diphtheria toxoid and Ramon has shown that it is possible to immunize human patients so that their serum contains a relatively large amount of antitoxin which persists for a long time. It has always been possible to confer a transient immunity to tetanus by means of antitoxic serum, and this, as a rule, suffices to prevent tetanus when administered after the infliction of a wound. By the use of tetanus toxoid, however, a lasting immunity can be established, and this might be of great importance in military medicine, more especially as immunization with tetanus toxoid can be carried out at the same time as T.A.B. inoculation. Ramon has, indeed, demonstrated that the yield of tetanus antitoxin is greater if the toxoid is given simultaneously with T.A.B. vaccine.

Recently staphylococcus toxoid has been used in the treatment of staphylococcus infections and there are some reports that it materially benefits such conditions as furunculosis, sycosis and similar manifestations. The position here is not quite so clear as in diphtheria where the procedure is purely prophylactic, and where it is only used in those who have never had the disease and whose serum is deficient in antitoxin. The patient with furunculosis has usually an amount of antitoxin in his serum not materially different from normal, but occasionally there are patients with higher or lower amounts. The administration of staphylococcus toxoid certainly increases the amount of antitoxin in the blood, but there are some patients who have recurrences of boils in spite of a high titre of antitoxin. A point that must not be lost sight of is that staphylococcus toxoid must contain a certain amount of vaccine from the autolysis of cocci during the two or three days' growth necessary for the production of the toxin. It has been amply demonstrated in the past that staphylococcus vaccines prepared in such a way that they contain little or no toxoid are of great benefit in furunculosis and other local staphylococcus infections. It is probable, therefore, that the "toxoid" has a twofold action due to its two antigens, the actual toxoid and the dissolved bacterial substance. If this is so, then different batches of "toxoid" will vary in their effects not only because of differences in the strength of the toxin from which they were made but also because of variations in the amount of dissolved bacterial vaccine. The former can be easily titrated but at present it is not possible accurately to estimate the latter. There are indications that for local conditions the best results will be obtained by adding staphylococcus vaccine to the filtered toxoid.

IMMUNIZATION AGAINST YELLOW FEVER

The unfortunate expedition to Africa which resulted in the deaths of Adrian Stokes and Hideyo Noguchi, resulted in the discovery that yellow fever was really a virus infection. It is well known that many virus infections are followed by a complete and lasting immunity, and Jenner with smallpox and Pasteur with rabies showed that it was possible to immunize man against virus infections. In recent years the production of a solid immunity against virus infections of animals has been well worked out, and the methods used for these have been applied to man in the case of yellow fever. In a recent article Findlay[3] described an improved method whereby certain inconveniences were avoided. An area of about one square inch of skin is infiltrated with one c.cm. of an immune serum of known strength and two hours later there is injected into the same area 0·2 to 0·5 c.cm. of a 1 in 10 filtered suspension of infected mouse brain in normal human serum. The reactions following the injections were comparatively slight and in all cases tested a marked degree of immunity resulted. The reaction can be further lessened by the introduction subcutaneously of 5 c.cm. of immune serum at the same time that the skin is infiltrated.

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PRACTICAL NOTES

THE TREATMENT OF FURUNCULOSIS

The methods employed at the Cook County Hospital, Chicago (which is stated to be the largest general hospital in the world, with some 3,000 beds), are being described in a series of articles, in the *Journal of the American Medical Association*, arranged by Dr. Bernard Fantus, director of therapeutics at the hospital. In the *Journal* for August 11, 1934 (ciii, 411), the treatment of furunculosis is described. The more severe cases require both local and general treatment. Special methods are indicated in furuncle of the external auditory meatus, of the nares and of the lips. Abortive treatment, if applied early, may succeed. It consists of: (1) Avoidance of traumatisms, even of the slightest degree, such as pressure and friction from clothing, as well as squeezing; (2) Improving the inflammatory reaction by (*a*) heavy coating with full strength tincture of iodine, or (*b*) X-ray application with 180 kilovolts, 300 roentgens, with a filter of 0.25 mm. of copper and 1 mm. of aluminium, at 50 cm. distance and with 30 milliamperes, applied to a rather large field. The two (*a* and *b*) methods must not be combined. Recurrence of the furuncles should be prevented by: (1) Washing the affected area with tincture of green soap and a face brush and hot towel, followed by alcohol or other disinfectant lotion:

Salicylic Acid Lotion

℞	Salicylic acid	2.00 gm.
	Alcohol	75.00 c.cm.
	Water	to make 100.00 c.cm.

Sig. Apply locally.

(2) Frequent hot baths and changes of underclothing should be given. (3) The skin should be kept dry by dusting with salicylated talcum powder:

Salicylic Acid Dusting Powder

℞	Salicylic. acid.	1.50 gm.
	Talci	30.00 gm.

Sig. Dusting powder.

(4) For areas (back of the neck or the axillæ) in which boils obstinately recur, a series of five to six X-ray treatments (85 kilovolts, no filter, 75 roentgens, once a week) often suffices for a permanent cure (possibly, in part, by antagonizing hyperhidrosis).

THE PREVENTION OF POST-OPERATIVE WOUND INFECTIONS

Wound infections following surgical operations in clean cases should not occur, but, unfortunately, such infections have been found to be prevalent. Questionnaires were sent to 75 prominent surgeons in widely separated sections of America, and only nine surgeons reported freedom from infection, while one surgeon reported as high as 10 to 15 per cent. of infections. In most cases the infections were without known cause, and in many instances lack of strict operating-room control was apparent. Lack of such control is a weak point in many large hospitals. At the United States Marine Hospital, in

Mobile, a small, closed staff and nursing personnel, with a semi-military organization, probably permits a stricter enforcement of preventive measures than is possible in most American civilian hospitals, and Edwin H. Carnes publishes (*Public Health Reports*, United States Public Health Service, August 10, 1934, xlix, 939) an interesting report on this problem. In the prevention of infections, consideration is given: (1) to proper sterilization of instruments, gloves, suture material, linen, sponges; (2) to preparation of the patient, including draping; (3) to preparation of the staff; (4) to operative technique; and (5) to care of the operating room. The efficiency of the surgical mask is an important factor in preventing infection. Three successive deaths from hæmolytic streptococcus infection were investigated by another authority and demonstrated that these were air-borne from the breath of streptococcus carriers who not only failed to mask the nose, but covered the mouth with masks which were far from germ-proof. A mask is described in which a sheet of rubber is incorporated, covering both mouth and nose, and has demonstrated its effectiveness by bacteriological controls. The objection to this mask is the discomfort and heat produced by the rubber layer. The mask that Carnes finds most practical and comfortable is the usual mask large enough to cover nose and mouth with ample margin, but gathered or pleated at each end, which makes it fit snugly over the nose and under the chin. It does not tend to slip up or down and is particularly valuable when the wearer uses spectacles, as the expired air does not fog the glasses. The " set " on the nose can be rendered still more firm by the incorporation of a strip of flexible metal in the upper edge, and bending this over the nose at the desired level. As regards " scrubbing up " the hands, it has been found rather surprisingly that about 10 minutes' scrubbing is more effective from the standpoint of removal of bacteria than longer periods. Smears from the hands were made on 3¾-inch agar plates at the end of 10, 15, and 20 minutes and incubated for 72 hours. At the end of 10 minutes of scrubbing, cultures from the hands showed an average of only one bacterial colony; at the end of 15 minutes an average of six colonies, bacterial and yeast; and at the end of 20 minutes an average of 24 colonies. The colonies obtained from the hands at the end of 10 minutes showed *Staphylococcus aureus*; those at the end of 15 minutes, *Staphylococcus aureus*, yeast, and *B. coli*; at the end of 20 minutes, *Staphylococcus aureus*, *albus*, and yeast. These findings can be accounted for only by the assumption that prolonged scrubbing brings bacteria from the depths of the skin crevices and pores to the surface.

DIGESTIVE DISTURBANCES IN PULMONARY EMPHYSEMA AND THEIR TREATMENT

J. Lesserre draws attention (*Progrès médical*, 18 August, 1934, 1305) to the not uncommon form of emphysema in elderly subjects in which the main symptoms are those referable to the digestive organs. The clinical picture may, in fact, be purely that of an atonic dyspepsia. Such patients, who as a rule are not plethoric, complain of poor appetites, flatulence, and a sense of repletion after a small meal. They present the signs of atony of the stomach, with radiological evidence of ptosis and slow movements of that organ. Constipation is usually present, though short attacks of diarrhœa may occur. Occasionally all the symptoms and signs of hepatic insufficiency are found. In these cases the spleen is palpable and tender, due to the onset of cardiac embarrassment. In the very obese emphysema is often accompanied by digestive disturbances. These patients have the typical " barrel-shaped " chest, short neck, and plethoric appearance of the emphysematous. In them meteorism is common. Broadly, there are two factors concerned in the production of these digestive disturbances. The one, the atonic factor, has the same cause as the emphysema, namely, failure of function of the supporting tissues; the other, exemplified by ptosis of the stomach, is the consequence of the emphysema. While it is obviously impossible to cure the primary lesion in emphysema, much may be done to relieve the gastro-intestinal symptoms which may cause more distress to the patient than the essential condition. Treatment is directed towards stimulating gastric secretion and by administering such chologogues as calomel in small doses. Atropine, either alone or combined with eserine, is very useful in cases in which there is obvious ptosis of the stomach. But even more important than drugs are measures for increasing the respiratory excursion of the chest. Breathing exercises must be performed daily, and massage of the abdominal muscles is often of value in combating atony. Care must be taken to avoid large meals, as excessive food may, by distending the stomach, impede free movement of the diaphragm.

THE TREATMENT OF IMPETIGO CONTAGIOSA

The contagious and auto-inoculable character of the pyogenic infections of the skin causes a great deal of inconvenience, especially in school children, among whom dissemination, both by direct and by indirect contact, occurs readily. The most important of the group of pyogenic infections is impetigo contagiosa, but under this grouping is included also ecthyma and infectious eczematoid dermatitis. Once the diagnosis of impetigo contagiosa is established, the difficulty is in attempting to control the spread of the infection, mainly because the application of occlusive dressings usually requires the use of adhesive tape, and the infection spreads where the tape has been fastened to the skin. The problem arises of finding an occlusive antiseptic dressing easily applied, and Joseph J. Hecht (*American Journal of Diseases of Children*, August, 1934, xl), has found metaphen 1 in 500 incorporated in flexible collodion a very useful dressing for this purpose. It is applied as follows : The skin surface surrounding the infected area is washed with soap and water and dried thoroughly with absorbent tissue. The lesion is painted with several layers of metaphen 1 in 500, in collodion, which is permitted to dry layer by layer. In twenty-four hours the easily removable layers of the metaphen-collodion mixture are removed with a tissue forceps. The adherent part is left on, and the mixture is reapplied in several layers. The procedure is repeated on the third day. On the fourth day all of the metaphen-collodion preparation, which by that time has curled up at the edges, is removed, and with it the underlying encrustation.

If the underlying skin is dry, light anointing with 2 per cent. ammoniated mercury is carried out. If, however, the surface is still moist, the metaphen-collodion mixture is applied for another period of three days.

PYELITIS OF PREGNANCY AND ITS TREATMENT

Although pyelitis of pregnancy is very common, fatalities are relatively few. H. Küstner (*Fortschritte der Therapie*, August, 1934, 459), suggests that the label " pyelitis " is given to too many cases in which the only evidence for the lesion is the presence of a large number of *Bacillus coli* in the urine and a slight rise in temperature. The *Bacillus coli* content of the urine is no indication as to whether pyelitis is or is not present. The diagnosis depends in a persistently high temperature with eventual rigors, and pain in the kidney region of a colicky nature. Treatment consists in first making the urine alkaline by means of an alkaline diet composed largely of fluids (milk, mineral waters, fruit juices, and potatoes), and administration of alkalies such as sodium bicarbonate or magnesium carbonate. Sodium bicarbonate is especially valuable for alleviating pain in the urinary tract. After two to three days of this treatment the urine should be definitely alkaline and the pain considerably less. Then a diet making the urine acid should be begun and the amount of fluid taken reduced. This diet should consist of a high protein content; bread may be allowed, but no potatoes. Tea with lemon may be allowed, but not fruit juice or milk. There is no need to supplement this diet with drugs. After two days an acid urine should be passed, and unless much pain is complained of, this diet should be continued until all signs and symptoms have disappeared. If acidification of the urine produces pain, a return to the alkaline diet should be made for two days and then the acid diet should be tried again. A fall to normal of the temperature and relief from pain are of greater prognostic significance than the urinary findings.

THE TREATMENT OF LOBAR PNEUMONIA BY ARTIFICIAL PNEUMOTHORAX

G. Hanau (*Gazzetta degli ospedali e delle cliniche*, 12 August, 1934, 977) has treated eleven cases of unilateral lobar pneumonia by means of induced pneumothorax, with two deaths, giving a mortality rate of 18 per cent. as against the general average mortality rate of 48.4 per cent. Neither death was directly attributable to the therapeutic measure. Local anæsthesia was employed. The quantity of air introduced was between 400 and 500 c.cm., the amount being regulated by the pressure in the manometer. Introduction of air was stopped as soon as the pressure became positive or the patient complained of pain. Another 400 to 500 c.cm. were introduced 18 to 24 hours later. No further refills were given. It is claimed that this method of treatment is a rational one as it gives rest to an organ which is functioning badly. The special advantages are that pleuritic pain ceases almost immediately and cough is greatly relieved. Whilst the method is obviously unsuitable for extensive or bilateral cases, the author claims that it has a place in the routine treatment of pneumonia. No complications have occurred in his cases.

THE TREATMENT OF VOMITING

O. Gärtner (*Therapie der Gegenwart*, August, 1934, 350) classifies the causes of persistent vomiting and gives a clear account of the mechanism involved, with reference particularly to the vomiting centre in the medulla. The two groups into which all causes of persistent vomiting fall are direct and reflex. Of the direct causes there are the mechanical, due to increased intracranial pressure, as in cerebral tumour or meningitis; and the toxic, as in uræmia, hyperemesis gravidarum, and the cyclical vomiting of children. The causes of reflex vomiting may be labyrinthine, as in Menière's syndrome, sea and railway sickness, or the reflex may be initiated by disturbances in such organs as the pharynx, the stomach or the gall-bladder or intestinal tract. Vomiting caused by drugs, such as morphine or digitalis, is probably due to a combined action on the vomiting centre. Gärtner considers that chloretone has as sedative an effect on the vomiting centre as codeine has on the cough centre, and employs this drug for the relief of vomiting without reference to the particular cause. If oral administration is impossible, it may be given in the form of a suppository. In order to combat the narcotic action of chloretone, caffeine may be given at the same time. This combination of drugs may be safely administered to children.

THE TREATMENT OF INSOMNIA

Wendell Muncie (*Bulletin of the Johns Hopkins Hospital*, August, 1934, lv, 131) discusses the treatment of insomnia in psychiatric practice. In the complaint disorders and minor psychoses where sleep becomes the object of concern and its disturbance a substitutive phenomenon, are dealt with obsessive fears, hypochrondriasis, and with hysterical reactions. Symptomatic treatment is mainly by explanatory reassurance and suggestion, planning of the day's activities, formulas to aid relaxation, and hyphosis. These fail unless accompanied by personality study with its more inclusive and far-reaching goals by which the immediate help becomes consolidated for future use. Drugs are avoided because of the danger of undue dependency and addiction in such constitutional, personality grounded illnesses. In states of fixation in a depressive mood with early waking, we depend on hydrotherapy (continuous tubs or cold wet packs) supplemented, when necessary, by veronal in nightly doses of from 0.15 gm. to 0.6 gm. The drug tends to prolong the sleep and to facilitate return to sleep when wakened. The results are usually gratifying both as to the improvement in the sleep and the amelioration of depressive distress. In manic excitements the best results have been obtained from the diurnal use of hydrotherapy—continuous tubs or cold wet packs instituted early in the illness and increased or decreased as necessary—coupled with sodium amytal 0.4 to 0.8 gm. (by mouth) or paraldehyde 6 c.cm. to 12 c.cm. (by mouth) at night. In milder cases, as in tension depressions, veronal administered orally in 0.1 gm. to 0.15 gm. doses two to four times during the day may reduce the tension to such a point that sleep may ensue without an hypnotic dose at night. This is often more effective in producing good sleep than giving the hypnotic in a single dose at night.

REVIEWS OF BOOKS

Nutrition and Disease : The Interaction of Clinical and Experimental Work. By EDWARD MELLANBY, M.D., F.R.C.P., F.R.S. Edinburgh : Oliver and Boyd, 1934. Pp. xix and 171. Illustrations 61. Price 8*s*. 6*d*.

THIS finely printed volume which, with its wealth of illustrations, rendered possible at such a low price to the reader by the generous grant from the Royal College of Physicians, contains much of the material embodied in the author's Croonian lectures in 1933 before that College and his Linacre lecture at St. John's College, Cambridge, in the same year. Incidentally it is eloquent evidence of the value of such endowments in stimulating the publication of original researches and of their practical applications. It is also a timely contribution to an important question recently arousing discussion, namely the relation of clinical and laboratory workers. From the experience of thirteen years as professor of pharmacology at Sheffield with control of hospital wards the author has shown the great advantage of combining in one person the clinical and experimental methods of investigating medical problems. That there are difficulties in finding the proper persons with the intellectual endowment and able to balance the physician's human interest in the patient with the investigator's desire to discover the origin of the disease must be admitted; such workers are rare, and they must be content to forgo private practice and its financial attractions. The six chapters prove that great advances with practical applications of far-reaching effect may thus be obtained. The importance of nutritional factors in the prevention of disease is convincingly illustrated by the clear accounts of the author's researches on rickets, thyroid disease, vitamin deficiency and infection, and by Mrs. Mellanby's epoch-making work on dental disease. The last chapter on the possible extension of the experimental results on nerve degeneration to certain clinical conditions is stimulating from its clear thinking, and contains a very interesting discussion on the etiology, prevention and cure of subacute combined degeneration of the spinal cord in pernicious anæmia.

Psychology and Psychotherapy. By WILLIAM BROWN, D.M., D.SC., F.R.C.P. Third edition. London : Edward Arnold & Co., 1934. Pp. viii and 252. Price 12*s*. 6*d*.

THE third edition of this book has been considerably revised and in parts re-written. It will no doubt have a large circulation, as had the previous editions, and no book that discusses psychology from so many different angles could fail to attract many readers. Indeed, Dr. Brown's versatility produces in this—as in other of his works—a peculiar inevitability, whereby every reader must be out of his depth in some chapter if not in several. For instance, the doctor or psycho-therapist who is likely to be interested in the record of a deep mental analysis contained in Appendix II will assuredly lay down the book when he is faced with the statement $\sigma\sigma_t^2=0{\cdot}00023998$ (p. 233). And, similarly, the student of psychical research who is seeking for amplification of Dr. Brown's pronouncement in the *Times* on the Rudi Schneider case (Chap.XIV) may be unwilling to peruse the two chapters on the Freudian theory. These two chapters have not undergone the process of "complete revision" which might have rendered them more acceptable to the sponsors of Freudian views. They are, frankly, somewhat out of date, and in dealing with any system of teaching as rapidly expanding as the Freudian it is necessary to be up to date. Indeed, the centre of gravity of Freudian teaching and practice has shifted in such an important way during the last few years that any account of them as they were, say, in 1925, is to all intents and purposes no longer valid. Dr. Brown has much to say that will command the interest of many readers on such subjects as Bergson's theory of memory, M. Coué's methods, and the Buchmann Group Movement. There is a chapter on peace and war which seems to steer the middle course between the sociological explanations exemplified by Trotter's "Herd Instinct in Peace and War" and the modern Freudian theories of sadistic impulses being the central dynamic factor. The author continues to adhere tenaciously to the rather outworn dictum of the French psychologists that "only hysterical patients can be hypnotized." Dr. Brown would, no doubt, admit that certain individuals can be hypnotized by one person and not by another. In such circumstances are they to be classed as hysterical? The modern view of the phenomena of hypnosis stresses the normality of the reactions of suggestibility in the young. Susceptibility of hypnosis may be strong evidence of suggestibility and, therefore, of immaturity, but it may also be evidence of transference relationship to the hypnotizer as was first pointed out by Ferenczy. So class hypnotizability as an exclusively hysterical characteristic is surely too simple a procedure for modern psycho-pathology? The book is a worthy monument of the author's brilliance and erudition, even if it lacks a certain coherence in structure and uniformity in content.

The Preventive Aspects of Medicine : A Series of Lectures delivered at King's College Hospital Medical School. Post-Graduate Series, Volume 2. London : *The Lancet*, 1934. Pp. vi and 376. Figs. 6. Price 10*s.* 6*d.*

THIS volume of twenty-five lectures, organized by Sir Charlton Briscoe, Director of Medical Studies, and Dr. J. A. Drake, the Dean of the Medical School, appropriately begins with Sir George Newman's essay entitled "The Student's Preparation," in which it appears that he became inoculated with the "preventive medicine bacillus" more than forty years ago. Other members of the Ministry of Health's staff contribute; for example, Dr. A. Salusbury MacNalty on the prevention of tuberculosis, Col. L. W. Harrison on venereal diseases, and Dr. J. M. Hamill on milk. Dr. Alison Glover of the Board of Education deals with preventable disease in school children, and Dr. J. C. Bridge of the Home Office with the prevention of occupational diseases. Professor G. F. Still, in his authoritative account of disease in infancy, believes that recent alcoholism in either parent before the conception of the child favours faulty development of unborn offspring. His successor at the Hospital, Dr. Sheldon, writes on the pre-school child, Dr. Poynton on rheumatism, and Professor Major Greenwood on the lessons of epidemiology. In a very attractive article " How to live the life of modern times," the title of which he obediently accepts, Dr. Kinnier Wilson gently shows how much better " The life of to-day " would be, as it " can be understood." Dr. Mapother of the Maudsley Hospital discusses a number of modern problems, such as sterilization and legalization of abortion, and expresses the hope that perhaps England will some day follow the enlightened example of Turkey in forbidding anyone to specialize in mental disorder unless he has passed the necessary examination after two years of supervised clinical work with patients of all kinds.

Modern Advances in Diseases of the Throat. By ARTHUR MILLER, F.R.C.S.E. London: H. K. Lewis & Co., 1934. Pp. xii and 120. Figs. 41 (1 coloured plate). Price 10s. 6d.

THIS short monograph, which is very well illustrated and produced, gives a good survey of recent work on the anatomy, physiology and pathology of the tonsils, leading up to a discussion of the pros and cons of the rather well-worn subject of tonsillectomy. Treatment of the tonsils by diathermy and removal by the guillotine and by dissection are all described in turn, and the author's views of the problems involved are conservative and sensible, especially in his recommendation of the removal of adenoids in children in many cases without the inevitable accompaniment of removal of the tonsils, when they are merely enlarged without being otherwise diseased. Malignant disease of the tonsil and pharynx is rather summarily dismissed. It is to be regretted that the author should have given his little book the title of " diseases of the throat," when it ends (as well as begins) at the tonsil. We should have had no quarrel with the title of " diseases of the tonsil " or even " of the pharynx "; but as it is, it is rather misleading.

Epidemic Myalgia: Bornholm Disease. By E. J. SYLVEST, M.D. Copenhagen. Oxford University Press. London: Humphrey Milford, 1934. Pp. 155. Price 7s. 6d.

THIS is a description of a disease, new to most medical men before 1933, by a general practitioner, and shows, as Professor Thorvald Madson says in a foreword, what a vast field for clinical observation is open to general practitioners in their daily work. Dr. Sylvest in 1930 wrote an elaborate monograph in Danish on this epidemic disease which he first recognized when taking a holiday in the Danish island of Bornholm, and it has now been translated in an abbreviated form. The author, who has seen ninety-three cases and refers to ten thousand in Denmark since 1930, analyses the known data. It has been described before, in Iceland (1856), Norway (1872), North America (1888), New Zealand (1896), London and Eton (1924), and other countries, and called " epidemic pleurisy," " acute muscular rheumatism," and " epidemic pleurodynia." It has a seasonal incidence in August and the following few months, and may imitate appendicitis and other acute abdominal conditions. Orchitis may occur. The prognosis is good, but as regards immunity it resembles influenza. The responsible virus is unknown. The translation is good and the printing excellent.

Recent Advances in Allergy (*Asthma, Hay-Fever, Eczema, Migraine*). Second edition. By G. W. BRAY, M.B., M.R.C.P. London: J. and A. Churchill, 1934. Pp. xv and 503. Illustrations 106, including 4 coloured plates. Price 15s.

THE high opinion expressed in the review of this work in these columns (*The Practitioner*, 1931, cxxvii, 503) when the first edition appeared has been endorsed by the demand for a further edition. The author continues to be an active worker and in the last three years has not only increased his own experience, but has added more than seven hundred references on the work of others. New chapters, such as that on nasal allergy, in which the removal of polypi is condemned, have been added, and wise condensation has been carried out elsewhere. Fresh illustrations have been provided, and the volume, which now contains about eighty more pages than in the original edition, fully deserves continued confidence as a sound survey of modern knowledge on a fascinating but complex subject.

Synopsis of Medicine. By HENRY LETHEBY TIDY, M.D., F.R.C.P. Sixth Edition. Bristol: John Wright and Sons, 1934. Pp. xvi and 112. Price 21*s*.

THIS work has, during the fourteen years of its success, secured a rather special position among the members of the profession, as indeed is shown by the demand of a fresh edition about every two years. It is really a reliable textbook in a succinct form, and is not a cram book or merely a student's guide; it is definite rather than obtrusively dogmatic, and teachers as well as pupils have found its value in the past and will continue to obtain the same help in this enlarged and extensively revised edition.

Diseases of Women. By TEN TEACHERS. Edited by Sir COMYNS BERKELEY, J. S. FAIRBAIRN and CLIFFORD WHITE. Fifth Edition. London: Edward Arnold & Co. Pp. 568. Figs. 185: 8 Plates. Price 18*s*.

TEXTBOOKS of composite authorship often present their subject matter in an unbalanced way. But largely as the result of good editorship, the book on diseases of women by Ten Teachers gives its reader a clear, concise and practical survey of gynæcology. Much work remains to be done before the hormonic control of the menstrual cycle is fully understood, but the book has succeeded in giving a clear account of this part of its subject as it is understood at present. The commoner gynæcological operations are briefly described but no attempt has been made to give operative details and the authors wisely state that the only way to learn to perform major operations efficiently is by serving a long apprenticeship of watching and assisting at operations. There is a welcome chapter devoted to the relation of neurasthenia and neuroses of pelvic disorders, an aspect of the subject too often completely neglected. The book is well indexed and illustrated and can be recommended without reservation both to those who must know some gynæcology and to those who are interested in the subject.

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ON BEING LIVERISH

IMP. INST. 19

By ARTHUR F. HURST, M.A., M.D., F.R.C.P.
Senior Physician, Guy's Hospital.

WHEN a young man, full of the knowledge gained from three years spent in studying medicine in the wards of an up-to-date hospital and from the most modern textbooks, is consulted during his first week of private practice by an old lady who feels "liverish" or a retired Indian civilian for his old trouble—"a touch of liver," he feels puzzled and is inclined to blame his teachers, from whom he has never heard of such disorders. He is familiar enough with the habitual drunkard dying from cirrhosis of the liver and with the deeply jaundiced patient with a huge lumpy liver caused by secondary carcinoma. He has probably seen a case or two of gumma or hydatid, and perhaps a soldier with an amœbic abscess; but this is likely to be the whole extent of his experience of disorders of the liver. He will naturally conclude that the patients who complain of their liver because they wake up with a dull headache, no appetite for breakfast, a dirty tongue and a general feeling that life is not worth living, must be suffering from that vague disorder, nervous dyspepsia, and accordingly he suggests a diet and a harmless mixture which is dutifully taken—but not without the dose of calomel or liver pill which no self-respecting sufferer from liver is willing to forgo.

It is curious that there is not any French or German equivalent for "liverish" or "a touch of liver." According to the Oxford Dictionary there is no record of the word liverish before the first quarter of the nineteenth century, and I am inclined to think that it was introduced by soldiers and civilians who came home to nurse their damaged livers in Cheltenham and Bath, as it was in India that the frequency of hepatic abscess first led the Army doctors to recognize the premonitory symptoms of a disordered liver. It is interesting to note that it is only now, when amœbic abscess has become a rare disease instead of being the most frequent cause of death in the Army in India, that the hundred-year-old explanation of the syndrome ascribed by the laity to the liver is again accepted by the medical profession as correct.

ALCOHOLIC HEPATOSIS

It is obvious that cirrhosis of the liver is only the last phase of a very long-standing disease, the early stages of which have passed unrecognized. It is now known that the liver cells are very easily poisoned by alcohol. As the condition is one of toxic degeneration rather than inflammation, it is more suitably described as hepatosis than hepatitis. Whereas the death-rate per million living from cirrhosis of the liver has fallen from 248 in 1902 and 185 in 1912 to 81 in 1922 and 50 in 1932, alcoholic hepatosis is quite common, especially among the well-to-do. The familiar symptoms of "the morning after the night before" are the symptoms of acute alcoholic hepatosis, and the lævulose test shows that definite hepatic insufficiency is present, and disappears completely within a few days. Habitual over-indulgence leads to a chronic alcoholic hepatosis, which is still capable of complete resolution, even if it has been present for many months. It is only when it has continued without intermission for years that irreparable damage is done; areas of necrosis, the place of which is gradually taken by new fibrous tissue now appear, the first stage of cirrhosis having at last developed.

Over-indulgence in alcohol is a very elastic term, what is excess for any given individual depending upon the vulnerability of his liver cells, which varies greatly in different people. It has nothing to do with his general reaction to the effects of alcohol, as alcoholic hepatosis is not often associated with alcoholic psychosis or peripheral neuritis. There is not even any close connection with alcoholic gastritis, the premonitory symptoms of cirrhosis, which have generally been ascribed to gastritis, being really hepatic in origin, and a normal curve of acidity without any excess of mucus is often obtained in patients with alcoholic hepatosis.

We have found that the "bright young people" who attend three or four cocktail parties a week may develop alcoholic hepatosis. Their anxious parents are apt to ascribe their sallow complexions, loss of appetite, mental torpor and irritability to incipient consumption or other serious disease, but the well-marked hepatic insufficiency revealed by the lævulose test and the tender and often slightly enlarged liver reveal the true nature of their malady. Complete recovery with disappearance of liver tenderness and return to a normal response to the lævulose test quickly follows a period of rest with a light diet and abstention from alcohol.

The following Table gives a few examples of the results of the lævulose test before and after treatment in alcoholic hepatosis :—

TABLE I

I		II	III
Maximum normal		25	0
F. 22 :		51	15
	22 days	23	10
M. 32 :		45	89
	16 days	37	61
	16 days	6	30
F. 56 :		44	49
	9 days	16	18
	5 months	25	0
M. 49 :		44	7
	9 days	15	−15
M. 56 :		49	0
	20 days	13	−11
M. 52 :		73	71
	3 months	0	−13
M. 45 :		58	31
	4 weeks	19	7
	6 weeks	10	− 6

Table I.—The lævulose test in cases of alcoholic hepatosis before and after abstention from alcohol for periods given in column I. Column II gives the rise in blood sugar above the fasting level in mgm. per 100 c.cm. one hour after taking 50 gm. lævulose, and column III two hours after. The maximum normal rise in one hour is 25 mgr. and in two hours the fasting level should be regained.

TABLE II

		I	II
Maximum normal		25	0
F. 53 :	Before treatment	71	31
	After treatment	16	18
F. 40 :	Before treatment	55	30
	After treatment	6	0
F. 33 :	Before treatment	34	—14
	After treatment	18	— 2

Table II.—The lævulose test in cases of amœbic hepatitis before and after treatment with emetine. Column I gives the rise in blood sugar above the fasting level in mgm. per 100 c.cm. one hour after taking 50 gm. lævulose, and column II two hours after.

The tender liver often aches, and the man with a touch of liver has generally a fairly accurate knowledge of its surface anatomy. He is never jaundiced, and latent jaundice, as shown by a positive indirect van den Bergh reaction, is uncommon; when present it disappears as rapidly as the abnormal response to the lævulose test.

In early cases, after a short period of strict treatment, it is only necessary to forbid alcohol in any form between meals, when, the stomach being empty, it is rapidly absorbed and reaches the liver in a comparatively concentrated form. A little beer, wine or well diluted whisky at lunch and dinner can then do no harm. But in more advanced and chronic cases it is useless to advise anything short of complete and permanent abstention from alcohol. This advice is easier to follow than might be expected, as the patients are never dipsomaniacs and have not the uncontrollable urge to drink. They drink because they like it, for conviviality, and because they find it difficult to complete a business deal without celebrating it with a drink. A badly damaged liver is abnormally vulnerable to such toxins as alcohol, and even a small dose is poisonous. But more important is the psychological fact that with his first drink a man's judgment is impaired, and though he may have intended to take no more, he will have a second and a third and so on *ad infinitum.* He is only safe when teetotal.

Alcohol is the commonest cause of liverishness, but it is far from being the only one. Toxins reach the liver by the portal vein from the whole alimentary tract, by the hepatic artery from the general circulation, by an ascending infection of the bile ducts from the duodenum, especially in the presence of achlorhydria, and by the lymphatics from the gall-bladder. Consequently, any form of food poisoning, the intestinal toxæmias which result from the habitual abuse of purgatives, though never from untreated constipation, and various infections, especially amœbiasis, malaria and typhoid fever, may lead to hepatosis. With the exception of amœbiasis they rarely produce sufficient damage to give rise to symptoms unless two or more are associated together or unless they are associated with over-indulgence in alcohol.

AMŒBIC HEPATITIS

The chronic ill-health which frequently follows prolonged residence in the tropics is often due to hepatosis caused by a combination of toxæmias and infections, the most important of which are alcohol, amœbiasis and malaria. In 1923 Covell discovered that hepatic insufficiency was constantly present in patients with amœbic dysentery, even if they had not any symptoms pointing to hepatic disorder. Since then we have found that many people who have been in countries in which amœbic dysentery is common have all the symptoms and signs of a mild form of chronic hepatitis, although they may never have had anything more than slight attacks of diarrhœa and have never passed either blood or mucus. Their stools are normal and the sigmoidoscope reveals a healthy mucous membrane. Yet their symptoms, which may have been present for years, disappear after a series of twelve nightly injections of one grain of emetine hydrochloride, after which the lævulose test shows that there is no longer any hepatic insufficiency (Table II). It is remarkable that this condition, which never leads to abscess formation, can persist several years after returning to England and yet remain amenable to treatment. Chronic amœbic hepatitis often remains unrecognized owing to reliance being placed on the presence of cysts of *Entamœba histolytica* in the stools as essential evidence of the existence of amœbiasis. To avoid the risk of recurrence these patients should be given a second series of six injections of emetine at the end of three months and then every six months for a couple of years.

THE LIVER IN CHOLELITHIASIS

It is sometimes assumed that nothing is needed for the development of gall-stones beyond biliary infection combined with deficient drainage of the gall-bladder. But the solitary cholesterol stone is certainly formed in a sterile gall-bladder. The important work of Chauffard who showed that there is a disturbance of hepatic function in all cases of cholesterol cholelithiasis, has been too much neglected in recent years. Stones are not likely to form unless cholesterol is abnormally liable to precipitate owing to excessive concentration or to some deficiency in the solvent power of the bile. It is remarkable that the majority of patients with gall-stones adopt for themselves a diet which excludes all foods containing cholesterol. It is sometimes chosen because eggs, cream and fat meat are known to cause indigestion, but equally often it is what one of my patients called her "instinctive diet," the patient having distaste for food containing cholesterol. I doubt, however, if it is really instinctive; it is probably an acquired and conditioned distaste, the protective origin of which has been forgotten.

If the hepatic factor in cholelithiasis is borne in mind, it should sometimes be possible to establish a prophylactic regime for patients who are likely to develop stones and a non-surgical treatment by dieting and promotion of biliary drainage by means of Epsom salts in the morning and olive oil before meals for the very early stages of cholelithiasis, when the stones are no larger than grains of sand and are still capable of being redissolved if saturation of the bile is prevented by the complete exclusion of exogenous sources of cholesterol.

The tender gall-bladder in cholecystitis is sometimes associated with tenderness of the adjoining part of the liver. In such cases there is rarely any hepatic insufficiency as shown by the lævulose test, and the van den Bergh test is negative. The tenderness is not due to any generalized hepatic disorder but to localized hepatitis caused by infection conveyed by lymphatics from the gall-bladder to the neighbouring part of the liver. When disinfection of the gall-bladder with large doses of hexamine, the urinary tract being at the same time protected with alkalis, and promotion of biliary drainage lead to a cure of the cholecystitis, the tenderness of the liver disappears *pari passu* with that of the gall-bladder.

BILIOUS ATTACKS AND MIGRAINE

What is called a bilious attack in a child is in most cases the equivalent of an attack of migraine in an adult. The mother, or less frequently the father, is often a sufferer from migraine, and the child is likely to develop it when he grows up. The term "bilious attack" is apparently derived from a misinterpretation of the fact that it often terminates with bilious vomiting. There does, however, appear to be some obscure connection between the liver and migraine in a certain proportion of cases. We have never found any sign of hepatic insufficiency as shown by the lævulose, and van den Bergh's test is negative both during and between the attacks. But when in the course of our investigations we aspirated a specimen of bile through Einhorn's tube after making the gall-bladder and bile ducts evacuate their contents by injecting magnesium sulphate into the duodenum, a number of patients asked to have the process repeated, as they felt clearer in their heads and altogether less bilious than they had done for months. It is apparently the mechanical effect of unloading the liver of accumulated bile which has this unexpected result, as in every case the bile was quite normal, and there was not any evidence of co-existing cholecystitis or gall-stones. Such patients derive benefit from stimulation by means of biliary drainage by Epsom salts and olive oil.

A large proportion of sufferers from migraine know from experience that fatty food induces an attack, and among those who have not discovered this for themselves it is common to find that the exclusion of eggs, cream, fat meat, fried food and, as I have learnt from Dr. Ryle, especially chocolates, helps to prevent migraine. It is interesting to observe that these are just the cholesterol-rich foods which upset patients with gall-stones, and although there does not appear to be any special frequency of cholelithiasis among the migrainous, it seems not improbable that a disordered liver may be one factor in the complicated pathogenesis of migraine.

CATARRHAL JAUNDICE

In a recent paper Dr. Keith Simpson and I brought forward evidence to show that catarrhal jaundice is in a large majority of cases correctly named, being a result of obstruction to the mouth of the ampulla of Vater caused by catarrhal inflammation of the mucous membrane of the duodenum and terminal half-inch of the common bile duct. The initial symptoms, which subside when the jaundice appears, are those of acute gastro-duodenitis and are not hepatic in origin; they do not resemble in any way the symptoms of the genuine liver attacks which are the subject of this article.

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THE PRACTICAL VALUE OF LIVER FUNCTION TESTS

By CHARLES NEWMAN, M.D., F.R.C.P.

Junior Physician, King's College Hospital; Assistant Physician, Belgrave Hospital for Children.

THE supposed relative inefficiency of liver function tests has for a long time been a matter of recrimination on the part of clinicians, and of irritated distress on the part of pathologists. That is because the value of liver function tests is always compared (and contrasted) with that of the tests for renal function, to the disadvantage of the former. The clinicians are always asking for "some simple test which will tell us if the functional activity of the liver is intact, or if not, to what extent it is damaged." This demand rests on the fundamental fallacy that the liver has "a" function. The disadvantage of the experimental method is that nature always answers the question which we ask, not the question which we think we ask. When we perform a sugar tolerance test on a patient, we cannot pretend to be asking if this patient's liver function is intact, but only if, all the other aspects of sugar metabolism being normal, the patient's liver behaves in a normal way to this particular sugar. We have no reason to expect this test to give any information whatever regarding the other—about a dozen—known functions of the liver. In the case of renal function tests it happens providentially that the only function of the kidneys in which we are, as a rule, interested is the excretion of urea. It so happens that the capacity to excrete urea corresponds to the kind of clinical problem with which we are faced. But of course everyone knows how seriously the uncritical may be mislead when the case happens to be an unusual one and the urea excretion tests are mistaken for simply "tests of kidney function."

It is always possible that some day a simple function of the liver will be found to be deranged whenever anything goes wrong with the liver, which would be amenable to a simple method of testing. But there is not any justification for such a hope. Although the kidney has a great number of unit functions, they all come under one immediate head: the maintenance of the composition of the blood by the elimination of the superfluous. In the case of the liver there is no such unity, the functions are not only numerous but very diverse, and many of them wholly unrelated to one another. The liver is an extraordinary organ: either every cell is capable of performing many different functions, or else cells which are morphologically identical are physiologically quite distinct. What is obviously needed is a much more careful correlation between definite diseases of the liver and failure of certain functions, so that for each clinical problem it may be known which functional test will give the information required; for instance, if it could be said, " This patient has some clinical evidence of damage to his liver by heart failure; such and such a test will show its extent," or " This patient has either a very prolonged attack of catarrhal jaundice or an early biliary cirrhosis; the test which will distinguish them is so and so," then we should be a position to make proper use of liver function tests.

At the present moment what is known about the liver-function tests, their appropriateness and proper use and their reliability? Simple clinical signs and symptoms must be excluded from this article, not because they are unimportant, but because they are so important that they would need a special article to themselves and do not strictly come under the terms of reference implied in the title. As a matter of fact the clinical pictures produced by failure of certain liver functions, so well understood in the middle of the last century, have of late been terribly neglected. It is only necessary to read Budd's " Diseases of the Liver " to realise this.

The ordinary clinical tests of liver function are the investigation of the urine and fæces for bile, and of the urine for urobilinogen. The detection of bile pigments in the urine is not really a test for parenchymatous liver function at all, but only one for obstruction of the bile ducts, or disease of the extra-hepatic biliary system. Cholebilirubin, the pigment of obstructive jaundice, which gives the prompt direct Hijmans van den Bergh reaction, comes through the kidneys into the urine when it has reached a threshold of about 2 mgm. per cent. in the blood. There is not any fixed threshold; it depends largely on the rate of development of the jaundice. Hæmobilirubin, the pigment in normal blood-serum and of hæmolytic jaundice, never passes into the urine however much accumulates in the blood. This is certainly true up to concentrations of 8 mgm. per cent., the highest which has been observed.

The tests for bilirubin in urine are familiar; it may however, be worth mentioning that the iodine ring test does not seem to me to be quite so delicate as the play of colours produced by a drop of nitric acid, when this is run down the side of the froth formed by shaking a little urine violently in a test tube. The presence of bile salts in urine as indicated by the flowers of sulphur test is useful. The test, although it seems so simple, bristles with possible sources of error and, except when done under rigid precautions, a faint positive should be ignored. A definitely positive reaction means obstructive jaundice; a definitely negative reaction is quite common in catarrhal jaundice, though not invariable, and any case of sudden intense jaundice in which bile pigments and not salts are present in the urine is probably one of simple catarrhal jaundice. In chronic obstructive jaundice the bile salts disappear from the urine, and some time later the function of the liver begins to fail. This is the ordinary failure of function which supervenes in any gland when its duct is blocked. Although the disappearance of bile salts from the urine certainly *precedes* any definite failure of liver function, it may be taken as a warning that such failure is likely. The absence of bile pigment from the fæces is, of course, also evidence of biliary obstruction. As a rule simple naked-eye inspection of the fæces is sufficient, but in the presence of large quantities of fat the fæces may look colourless although pigment is still present. The normal pigment of the fæces is stercobilin, the test for which is very simple: rub a little of the fæces with a saturated solution of mercuric chloride in an evaporating basin or saucer with the blunt end of a test tube. Leave it to stand for about twelve hours and if stercobilin is present a red colour will develop.

Urobilinogen in the urine.—Urobilinogen appears in the urine under two main conditions: (*a*) excessive hæmolysis, and (*b*) liver function failure, especially toxic or infective liver damage. Provided therefore that the patient is not suffering from pernicious anæmia or acholuric jaundice, or poisoning with substances (such as potassium chlorate) which hæmolyse the red blood cells, the appearance of urobilinogen in the urine is an evidence of liver function damage. The only difficulty is that most general practitioners do not possess a spectroscope, and that the two tests (the zinc chloride fluorescence test and the colour produced with Ehrlich's reagent) are none too easy to interpret. It is, however, very easy to send a sample of urine to a laboratory, since it does not matter if the urobilinogen becomes converted into urobilin. The reason for the appearance of urobilinogen in the urine in liver function failure is unknown; the theoretical basis of our knowledge of the origin and fate of urobilin in the body is almost certainly fallacious. But this does not make any difference to the empirical fact that the test is of practical value. It sometimes gives positive results in cases of secondary carcinomatosis of the liver, a fact which may be useful, although it is important to realize that secondary growths in the liver are very rarely associated with any functional derangement of the organ whatever. It cannot be too strongly stressed that disease of the liver and damage to liver function are two entirely different things, and that the absence of evidence of liver function failure does not mean that the liver is not affected with some disease which may be of the utmost gravity to the body as a whole, but which does not interfere with its own function.

The metabolism of sugar.—This function of the liver has been utilized for the devising of various tests, two of which are of definite value. These are the lævulose and galactose tolerance tests. Of the two, galactose has certain advantages, in that, for instance, it gives a better index of the failure of liver function in pernicious anæmia, but its high cost is a disadvantage. The lævulose tolerance test needs laboratory facilities for its performance. It is done by estimating the fasting blood sugar and then giving a dose of 30–50 gm. of lævulose, dissolved in water, by the mouth. At half-hourly intervals after taking the sugar the blood sugar is estimated. The normal liver should be able to convert lævulose into glycogen so rapidly that the blood sugar never rises more than 30 mgm. above the fasting level and it should return to normal in 1½ hours at the latest. A rise of over 30 mgm. above the fasting level or a slow and prolonged rise in the curve is an index of parenchymatous liver damage. This test has been of very great use in proving that many cases of so-called " catarrhal jaundice " are in reality cases of mild hepatitis, and a positive result is usually given in any form of toxic or infective parenchymatous liver damage. It can be used for the early diagnosis of liver damage during the malarial treatment of general paralysis of the insane or in the salvarsan treatment of syphilis, although for the latter the van den Bergh test is simpler. It is necessary of course to be sure that the patient is not suffering from diabetes or ketosis, as either of these would produce the same type of result as damage to the liver. The original method of applying the test, by testing for sugar in the urine after the taking of lævulose, is unfortunately practically useless.

Pigmentary function.—The van den Bergh reaction has proved to be one of the simplest and most reliable tests of liver function. It had great advantages over the icterus index and Fouchet's test; the icterus index only gives an estimate of the total amount of yellow pigment in the serum, which is often not bilirubin at all (as, for instance, in carotinæmia), and Fouchet's test only proves that bilirubin is present and gives no indication how much or what type of bilirubin the serum contains. There is no need here to go into details about the technique of the van den Bergh test, it is readily available; suffice it to say that it is extremely simple, that the reagents can be kept indefinitely (contrary to what is usually stated), and that permanent standards for quantitative estimation can be made from cobalt sulphate and water. The only trouble is that a centrifuge is necessary, but there is no need for it to be a high-speed one. The test gives the following information: (1) It tells, by the prompt or delayed reaction in the direct test, whether the pigment is that of hæmolytic or obstructive jaundice, or, to put it another way, whether the pigment is the normal hæmobilirubin retained in the blood, or the abnormal cholebilirubin regurgitated into the blood from the liver. This is not of supreme importance in the differential diagnosis between obstructive and hæmolytic jaundice, which can be decided clinically; but it is of immense value in determining the presence of latent jaundice, namely, an abnormal quantity of bilirubin in the serum which is insufficient to cause pigmentation of the skin and urine. A very slight rise in total quantity, say from 0·3–0·5 mgm. per cent., with a faint but clearly visible prompt reaction is one of the earliest findings in cirrhosis of the liver. (2) It is very easy to take advantage of the solubility of hæmobilirubin in chloroform for the estimation of the amount of this pigment present in cases giving a prompt direct reaction. I shall publish the technical details of a method shortly, but for routine work a good deal of information can be obtained by the following simple procedure :—

Shake 1 c.cm. of serum with 2 c.cm. of chloroform well and let it stand. If the chloroform layer which sinks to the bottom is hardly yellow, the serum contains little hæmobilirubin; if it is deeply pigmented the serum contains a good deal. In cases of catarrhal jaundice the hæmobilirubin content is high at first and quickly falls to normal, while the cholebilirubin remains high. In simple obstructive jaundice the hæmobilirubin content is at first normal; later, with the onset of failure of liver function, as the result of obstruction of the duct, the hæmobilirubin rises, the cholebilirubin remaining high throughout.

It is thus possible, by doing serial tests, to tell (*a*) whether the case if one of simple obstructive jaundice or of " catarrhal jaundice," and (*b*) how long it is safe to leave a simple obstruction unrelieved by operation.

All the toxic infective hepatic jaundices show an abnormal increase in hæmobilirubin content. Even the ordinary quantitative reaction has been found of use in foretelling the possibility of disaster during the administration of salvarsan, for instance. It is fortunate that the pigmentary function of the liver is disturbed in a very great many of its parenchymatous diseases, even apart from the appearance of visible jaundice; the van den Bergh reaction is therefore definitely one of the most useful of the liver-function tests.

Fat metabolism.—Of the tests based on this function only one, the blood lipase content, has been of value, and even this is not very useful. It is performed by incubating serum with ethyl butyrate and estimating the liberated butyric acid by titration with alkali. The disadvantages of the test are (1) that ethyl butyrate has an exceedingly unpleasant penetrating smell, and (2) the difference between normal and abnormal figures is very small. The test, however, does seem to give positive results in some cases of early and acute liver damage when other tests reveal very little.

Detoxicating function.—The tests depending on the intravenous injection of a dye, such as rose bengal or bromsulphalein, and the estimation of its rate of disappearance from the blood (as an index of the rate at which the liver excretes it), have been very definitely useful, especially in those liver diseases, such as eclampsia, which do not cause jaundice. They are, however, rather tedious to perform and unpleasant to the patient because of the need for repeated vein punctures. Except by research workers the test is scarcely applicable on a large scale. The importance of this type of test is that by the use of phenolphthalein derivatives it was the origin of cholecystography. Widal's hæmoclasic crisis, about which much has been written, is based on a fallacy, gives no valuable information, and is enormously laborious to perform.

Protein metabolism.—There is probably a future for tests depending on the de-aminizing function of the liver, but at present none of them are sufficiently substantiated to be recommended.

Iron metabolism.—According to Brugsch, when the iron metabolism function of the liver fails, it is partly taken over by the skin, in which free iron appears. This can be discovered by injecting a minim of 1 per cent. solution of potassium ferricyanide into the skin so as to form a minute bleb (as in performing the Mantoux tuberculin test, or the Schick test for diphtheria). If free iron is present a blue stain develops, trailing away along the line of lymphatic drainage. To anyone who has had any experience of intradermal injections the test is the simplest possible. I have been trying it for some time and it seems to give useful results, at any rate in cases of prolonged obstructive jaundice in which the liver is beginning to suffer. The only objections to the test are:—(1) It is said occasionally to cause necrosis of the skin and a small ulcer. I have seen this, yet it may well be the result of too large an injection, or of sepsis which it is easy to prevent by boiling the solution immediately before use. (2) The solution of potassium ferricyanide keeps very badly and it is a trouble to make up fresh solutions every time. Once one has a clear picture in one's mind of the depth of colour of a 1 per cent. solution, there is no need for accurate manufacture—a small crystal dissolved in as much water as makes a solution of approximately the correct intensity is quite accurate enough.

I have not mentioned the innumerable tests for liver function which are still in the experimental stage and of which I have not any personal experience. If these recommendations and opinions differ from those of other writers it is because it seems more useful to recommend to others what one knows to be simple and valuable, rather than to give suggestions at second hand from the literature.

THE SURGICAL TREATMENT OF SOME BILIARY AND HEPATIC DISEASES

By A. E. MORTIMER WOOLF, M.B., F.R.C.S.
Surgeon, Queen Mary's Hospital for The East End.

IN this country the necessity for surgical interference in diseases of the liver is on the whole rare. The liver, however, may be, and frequently is, affected secondarily by diseases of the biliary tract; and surgical treatment of the gall-bladder and its ducts is often necessary. Therefore in this article it is proposed to consider (A) diseases of the biliary tract, and (B) the treatment of some hepatic conditions.

DISEASES OF THE BILIARY TRACT

1. *Gall-stones.*—Calculus formation is probably the most frequent condition for which operation is performed. The symptoms are well known and need little elaboration here. Apart from biliary colic there are many indications for operation on the gall-bladder, but it cannot be denied that it is difficult to persuade patients to undergo operation unless they have had one or more attacks of the agonizing pain of true biliary colic. Even in the small percentage of cases in which gall-stones can be shown to exist by plain X-ray examination, operation is shunned if pain has not been severe and if colic has not occurred. The question then arises—is it necessary, or desirable, to operate on every case of gall-stones once they are proved to be present? Theoretically, yes; practically, no. Each case must be considered on its merits. Some patients may remain well for many years without surgical interference, but it is essential that they should be kept under regular medical observation and treatment. Sometimes conditions exist, such as coincident disease of the renal system, or gross disease of the

vascular system, which may render operation hazardous. Sometimes, however, the myocardium becomes secondarily affected by prolonged biliary disease, and severe cardiac pain may occur simulating angina pectoris, to which attention has been drawn by Charles Miller.[1] This condition has been termed the "cholecystitic heart," and is no bar to operation; not infrequently, as Miller points out, the cardiac condition improves considerably after a successful operation on the gall-bladder. As a rule, when patients have experienced real biliary colic, they are anxious to be operated on in order to avoid subsequent attacks. But not all cases of gall-stones give rise to biliary colic. The larger the collection of stones the more unlikely is colic to occur. Colic is usually due to a very small stone, or perhaps a piece of grit, which has been caught up either in the cystic or common-bile duct, and the muscular contraction which occurs in the attempt to force the obstruction gives rise to the severe pain.

The possible sequelæ of not operating on a case of gall-stones in the early stage are as follows:—(1) An attack of acute cholecystitis may supervene (*vide* p. 573). (2) Stones may pass into the common duct and cause further symptoms (*vide* p. 577). (3) Stones may ulcerate into the small intestine and give rise to intestinal obstruction. (4) Stones may ulcerate into the large intestine, thereby bringing about a natural cure—obviously a very unsafe contingency to hope for. Very occasionally a stone may ulcerate through the abdominal wall. This, however, does not necessarily lead to cure, and again it would be unwise to anticipate such a happening. The following case is an example:—

A rather stout man, aged 54, who had had symptoms of gall-stones for many years and had previously refused the advice of another surgeon to undergo operation, developed a tender swelling under the right costal margin. The skin was red, and the swelling was obviously invading the abdominal wall. An abscess in connection with the gall-bladder was diagnosed. An incision was made, and immediately under the skin was a large gall-stone, elongated and rounded at both ends (Fig. 1). The stone was removed.

FIG. 1.—A gall-stone—actua size—which had ulcerated through the abdominal wall.

At a second operation the gall-bladder was found to be adherent to the transverse colon, in which there were three small openings where the two viscera had communicated. These were closed and the gall-bladder was removed. The patient made an uninterrupted recovery.

Here, then was an example of a gall-stone which had made an attempt to ulcerate into the large intestine, and for some reason had changed its course into and through the abdominal wall. (5) Carcinoma of the gall-bladder may eventually occur (*vide* p. 578.)

2. *Acute cholecystitis.*—Patients with this complication usually present themselves as more or less acute abdominal emergencies, and diagnosis is not always easy. There is generally an antecedent history of pain and dyspepsia, which suggests that gall-stones have existed for a considerable period. Rigidity and superficial and deep tenderness are commonly well-marked in the upper right abdominal quadrant. Not infrequently a tumour continuous with the liver can be felt; it has a rounded lower border, and may move with respiration. Owing to adhesions, however, respiratory mobility may be absent. Such a tumour is an enlarged gall-bladder, but sometimes it is masked by a large lobe of the liver and also by adherent

omentum. A diffuse, indefinite tumour results, which may be difficult to feel without an anæsthetic.

Although the patient may appear to be ill, with a high temperature and rapid pulse, there is never the great urgency to operate in these cases as there is, for instance, in acute appendicitis. Even when gall-stones are impacted in the neck of the gall-bladder, or in the cystic duct, it is best to allow cholecystitis due to this cause to subside (as it nearly always will) before operation is performed. To operate in the acute stage may be to court disaster. Of course, the patient must be kept under observation, and if clinically the condition grows worse, then operation must be undertaken. It may be said that not to operate in the acute stage is to incur a risk of acute hydrops, empyema, or even gangrene of the gall-bladder. This cannot be gainsaid, but even here the urgency is by no means so grave as in some other acute abdominal conditions, and if the patient is kept under proper observation, as soon as it is certain that the condition is not improving, operation can then be performed. If an acute empyema of the gall-bladder or gangrene is present, some simple drainage operation will probably be the best and safest method to adopt, although cholecystectomy may be necessary later.

3. *Chronic cholecystitis without stones.*—Of recent years this condition has caused much controversy, and there is no more difficult problem with which the surgeon may be faced than a patient who presents all the symptoms of gall-stones in which no calculi can be found at operation. A cholecystogram is of assistance in the elucidation of this condition. A gall-bladder may show abnormalities in the manner in which it absorbs the dye; even so, a definite percentage of error exists and is much more marked when the dye is taken by the mouth than when it is administered intravenously.

Gall-bladders should not be removed on mere suspicion. There has recently been a tendency to advocate this proceeding on the ground that even if calculi are not present, the gall-bladder may act as a focus of infection. I cannot agree with this teaching. It is perfectly true that it is possible to live quite well without a gall-bladder; it is also perfectly true that an adequate number of patients have been operated on and have survived for a length of time sufficient to prove that, although removal of the gall-bladder appears to cause dilatation of the ducts (both intra- and extra-hepatic), no permanent harm results. Without going into the question in detail, certain French authors[2] have put forward the view that the gall-bladder is merely absorptive in function; that it is, in fact, a mere " tensometer," i.e. an organ, the function of which is to accommodate itself to the varying pressures in the biliary system. They hold that bile in the gall-bladder does not return into the intestine. I cannot discuss this here; no doubt it is open to many objections. On the other hand, there is a good deal to be said for it. If the bile does go back into the intestine from the gall-bladder, then the cystic duct must be the only tube in the body which is not kept for " one-way traffic." If this theory be correct, it may explain the absence of ill effects after a successful cholecystectomy. That, however, is not to say that the gall-bladder is a useless organ, and should be removed without provocation. In other words, let us be careful to respect the integrity of the gall-bladder and not deal with it as a useless appendage, as has been the unworthy and unjustifiable fate of so many appendices.

On the other hand, there is undoubtedly a type of case in which gall-stones are not present, when the gall-bladder may be kept to the patient's own great detriment. At operation there are few problems which require greater nicety of judgment and quicker summing up of the antecedent history and physical signs than when stones cannot be felt. In some cases changes in the gall-bladder point to the desirability of its removal; an enlarged cystic gland and the radiation of fat in a fan-like manner at the neck of the gall-bladder indicate a chronic inflammatory process. Obviously a definite thickening of the gall-bladder means previous attacks of inflammation; such a gall-bladder, even in the absence of stones, should, without hesitation, be removed. The cases of " strawberry gall-bladder " are especially likely to cause difficulty of decision, and in some cases it is not possible to feel very minute stones or grit in a gall-bladder which is distended. In a stout female, who has borne children, who has had attacks of colic with definite tenderness in the region of the 9th costal cartilage, and whose cholecystogram may show a deficiency of filling or an abnormality in absorption, it is probably best to remove the gall-bladder, but in such cases great care must be taken that a wrong diagnosis has not been made. I have known a tumour previously regarded as an enlarged gall-bladder prove to be a hydronephrosis. The question of pancreatitis frequently crops up; duodenal ulcer may simulate gall-bladder disease very closely and may exist coincidently with it.

To sum up, it may be necessary and right to remove a gall-bladder in the absence of stones or gross pathological changes, but such removal must be undertaken with the greatest circumspection. The following two cases may be cited as examples:—

Case 1.—A doctor's wife had suffered for many years from occasional attacks of biliary colic; recently they had become more frequent. I had seen her in the last attack, which was followed by definite slight jaundice, with extreme tenderness at the tip of the 9th costal cartilage. At operation no actual stones were discovered, and the gall-bladder appeared to be normal. The cystic gland, however, was enlarged. The appendix had been removed many years previously. I removed the gall-bladder. This was eight years ago, and the patient has been free from attacks ever since.

Case 2.—A man was taken ill with violent biliary colic at his office in the city. On his way home he had another attack in the train. He had previously suffered from indigestion and flatulence. I saw him three days after the first attack, when he was definitely slightly jaundiced and very tender in the region of the gall-bladder. At operation the gall-bladder appeared normal. In view of the definite character of the symptoms, but with some misgiving, I removed the gall-bladder. This was nine years ago, and the patient has since remained well.

4. *Stones in the common duct.*—With stones in the common duct, the condition becomes much more serious, because infection is more likely to supervene. Not only may these patients suffer from repeated colic, but in addition attacks of cholangitis, accompanied by rigors and jaundice, may cause severe prostration. Before operation is undertaken, it is obviously wise to allow the jaundice to disappear, if it will. Nevertheless, the dangers of operating on patients with obstructive jaundice have been much exaggerated, and, if indicated, operation should not be withheld when it is certain that jaundice is either remaining stationary or increasing. It is popularly believed that stones in the common duct invariably give rise to jaundice. This is by no means constant. I have removed stones from this situation (in some cases the duct has appeared to be almost full of calculi) without any history of previous jaundice. On the other hand, mild, transitory jaundice may occur, although no stones are present except in the gall-bladder.

In any operation for gall-stones, the common duct must be exposed. Some surgeons maintain that it should always be opened, explored and drained, for fear of leaving a small stone—usually at the lower end—undiscovered. Others believe that this adds materially to the risk of the operation, and I incline to this view. On the other hand, if there has been an antecedent history suggestive of stones in the common duct, which at operation is found to be dilated, the duct should be opened and explored, and, of course, subsequently drained. Usually stones, if present, can be felt by placing a forefinger in the foramen of Winslow and very carefully palpating the duct with the thumb in front. Sometimes if there is a thick pancreas, or any degree of pancreatitis, a stone low down in the common duct may escape detection. Even on the post-mortem table I have seen a stone in this situation missed, until the duct was slit right down into the duodenum. Stones occasionally slip up into the hepatic ducts and are then very difficult to find.

5. *Carcinoma of the gall-bladder.*—This condition, happily, is rare. It nearly always follows a history of the presence of gall-stones for many years, with attacks of cholecystitis. It may be difficult to be sure that the gall-bladder is malignant without histological examination. Any thickening of doubtful nature, more especially at the neck of the organ, should be investigated from the point of view of carcinoma. In these circumstances operations may be formidable. The neck of the gall-bladder may be very adherent to thickened surrounding structures, rendering removal extremely hazardous. Not infrequently, an area of liver surrounding the carcinoma may be involved, and some surgeons believe that a wedge-shaped area of liver should be removed with the gall-bladder. The ultimate outlook, however, in carcinoma of the gall-bladder is wellnigh hopeless.

Cholecystectomy versus cholecystostomy.—Periodically, a campaign breaks out between the protagonists of these two operations. Those who advocate cholecystostomy maintain that cholecystectomy is a more dangerous operation, with a higher mortality; that the loss of the gall-bladder is of serious import to the patient; that recurrences in the ducts are not uncommon, and that the removal of the gall-bladder is apt to cause dilatation of the ducts (both intra- and extra-hepatic), and result in cirrhosis of the liver. Moreover, they hold that the gall-bladder, when opened, acts as an efficient drainage tube and can be utilized subsequently if necessary. To this argument, the "cholecystectomists" retort that the necessity for draining a gall-bladder a second time should not arise. They point out that in the majority of cases, stones are formed in the gall-bladder; that the chances of recurrence of gall-stones after cholecystostomy are considerable; that if stones in the common bile duct have to be removed at some subsequent period, they have probably been overlooked at the first operation; and lastly, that the risk of carcinoma is always present.

As in all surgical controversies, there are elements of truth on both sides, and the probable solution of the whole matter is an individual one; that is to say, that where one surgeon will obviously pursue the method that has given him the best results, so also will another, who employs a different procedure. One must not be too rigid or hidebound in one's surgery. It is a mistake to operate on a case with the fixed idea that some particular operation is to be performed. Every surgeon must be prepared to adapt his methods to the conditions that appear to him to be present. Hence the probability is that some cases are more suitable for cholecystectomy and others for cholecystostomy. One thing, however, is quite certain. If the junction of the three ducts—the cystic, the common and the common hepatic—cannot be exposed in such a way that the three independent ducts can be demonstrated to the assistant, cholecystectomy is unjustifiable. It is not right to place a clamp where the cystic duct may be, without first defining the duct and seeing exactly where that clamp should be placed. Neglect of this precaution has led in the past to accidents involving the common bile duct. On the whole, I prefer the operation of cholecystectomy if it can be performed. I have been impressed with the number of cases I have had to operate on after a previous cholecystostomy elsewhere. As there is an intimate connection between the lymphatics of the gall-bladder and of the pancreas, in gall-bladder infections it would appear to be a sound surgical principle to remove rather than to drain it. But it may be repeated, because it is so important, that cholecystectomy should never be performed unless the anatomy of the neck of the gall-bladder can be thoroughly exposed.

THE SURGICAL TREATMENT OF SOME HEPATIC CONDITIONS

In the space available, it is only possible to deal briefly with some of the more common hepatic conditions that may require surgical treatment.

1. *Injuries.*—The liver may be the only organ injured, but more commonly some of the other abdominal contents are involved. When the liver is torn, there is usually considerable hæmorrhage into the peritoneum. If there is only a slight tear, it is not always necessary to operate, especially if the symptoms are not particularly severe, and are not increasing. On the other hand, if signs of free fluid exist, and the patient's condition is obviously growing worse, laparotomy should be performed. In slight cases, the liver may be successfully sutured. Frequently, however, it is so torn and friable that suture is not practicable. The insertion of sutures into the liver is always difficult, as they are so apt to cut through. For the various methods that have been devised to prevent this, reference must be made to textbooks on operative surgery. In some cases packing must be employed, in order to allay hæmorrhage. The danger of this is that, while the method is successful for the time being, almost invariably septic conditions arise, and the patient dies in about a fortnight or three weeks from pylephlebitis.

2. *Pylephlebitis as a complication of appendicitis.*—Any septic focus draining into the portal area may give rise to pylephlebitis, but an appendix abscess situated in what has been termed "the silent area," i.e. deep in the pelvis, is probably the most frequent cause. The following two cases are examples:—

Both patients had been running a temperature for several weeks, and had been admitted into fever hospitals with the diagnosis of "typhoid fever." Radiological tests were negative. After three weeks, one of these patients discharged himself to his home, and I was asked to see him. He did not appear to be very ill, but was running a temperature from 102° to 103° F. every night, and this had continued for about six weeks. Rectal examination disclosed a hard, thickened ring in the pelvis, obviously a mass of induration in the pouch of Douglas. I admitted him into hospital, and within forty-eight hours he became extremely emaciated; indeed, the sudden thinning and falling away of the face was remarkable. (This is not an unusual feature in the last stages of pylephlebitis.) At operation, a very small pelvic abscess was evacuated. The patient died, and at post-mortem examination an appendix was found curled up on the under surface of the mesentery, low down in the pelvis; at the tip of the appendix was a small abscess. The liver (which was not enlarged) was riddled with numerous small collections of pus.

The second case was a boy of 20. He was jaundiced and his temperature was swinging. Abdominal examination showed a slight thickening of the right side of Douglas's pouch, but this was not nearly so marked as in the first case. In view of my previous experience, I diagnosed "pylephlebitis due to appendicitis," and refused to operate. The boy died in forty-eight hours, and at the necropsy an exactly similar condition to the previous case was found. The appendix, deep in the pelvis, was curled up on the under side of the mesentery, and at the tip was a very small abscess. The liver was much enlarged and appeared to have been nearly destroyed by multiple abscesses of varying sizes.

An operation on the appendix in an early stage would probably have saved both these lives. On the other hand, this quiet suppuration in the appendix situated deep in the pelvis on the inner side of the mesentery without causing abdominal signs is a condition exceedingly difficult to diagnose.

3. *Hepatic conditions arising after acute fevers.*—Occasionally, after an acute fever such as influenza, the liver becomes tender, arousing suspicion either of a hepatic abscess or of pylephlebitis. Such cases usually run a temperature, complain of pains and tenderness at the costal margin and, for a time, appear to be exceedingly ill. Happily, they nearly always recover.

4. *Hydatid cysts.*—Although hydatid cysts occur in this country, they do not often fall to the lot of the general surgeon. A hydatid cyst in the liver may suppurate. In one case which I have recorded[3] a large hydatid cyst at the back of the liver suppurated

after an operation for removal of the gall-bladder. The physical signs pointed to a subphrenic abscess, but at operation through the diaphragm, after removing a portion of the 8th rib, a large hydatid cyst was evacuated. The patient eventually recovered completely. A hydatid at the back of the liver rarely suppurates; most commonly it happens in front, and it is then advisable to open the abdomen from in front and not from behind. Scrupulous care must be taken to prevent spread of infection by the contents of the cyst. Various methods have been described for removing the endocyst. The ectocyst can never be removed, but removal of the endocyst, if possible, is important, otherwise recurrence is very likely to occur. If the endocyst cannot be removed, marsupialization is probably the best course.

5. *Hepatic abscess.*—By hepatic abscess is meant an abscess caused by the *Entamœba histolytica.* This has become more frequent since the War, and in all cases of tumours of the liver or pain, it is well to inquire if the patient had been at the War, and had contracted dysentery. But not every case of alleged dysentery is a "true bill." Patients, especially if they have been soldiers, are apt to regard any prolonged diarrhœa, such as was so prevalent in the eastern theatres of the War, as dysentery; and even if they give a history of having had emetine injections, it does not necessarily prove that the condition was due to the amœba of dysentery. Sometimes these injections were given without complete bacteriological investigation and proof. When it is certain that an amœbic abscess is present in the liver, it should be evacuated. The usual method is to operate through the diaphragm after resecting a rib. My own small experience is that equally good results are obtained by evacuating anteriorly. It has been recommended that the abscess should be washed out with solutions of emetine. It is doubtful if this is of much use, but a subsequent

course of emetine by hypodermic injections should be given. A drainage tube is unnecessary and unwise. If a tube is inserted, it is almost impossible to prevent secondary infection. The cases seem to do perfectly well if the abscess is merely evacuated.

6. *Cirrhosis.*—Operations for this condition have been practised with varying success. The popular operation some years ago was to insert the omentum into the abdominal wall, and thereby make a junction between the portal and systemic circulations. Some cases have been reported as improved and even cured, but the danger is not inconsiderable, and the "cures," when scrutinized, are by no means satisfactory. The operation is hardly ever advised now.

7. *Carcinoma.*—The diagnosis of carcinoma of the liver may be obvious, but sometimes difficult, especially in the rare condition of primary carcinoma of the liver. Sometimes simple tumours exist in the form of angiomas or solid adenomas. Some of the latter are very atypical in structure and suggest malignancy. Grey Turner has recorded the successful removal of one of these hepatomas,[4] the man being well some years later. Lawrence Abel recently published a case in which he removed a primary carcinoma of the liver,[5] but at the time of publication the patient was going downhill and was obviously moriturus.

In most cases of secondary carcinoma of the liver the diagnosis does not present any difficulty, although occasionally it may not only be obscure but be confused, even on the operating table, with multiple gummata. Extensive metastasis may occur without jaundice or obvious ascites, and is beyond the range of surgery.

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JAUNDICE

By A. C. HAMPSON, *M.C.*, M.A., M.D., F.R.C.P.
Assistant Physician, and Assistant Physician to the Children's Department, Guy's Hospital.

IN the strict sense of the term, jaundice suggests yellow staining of the skin and mucous membrances; this is due to an excess of bile pigment in the blood, and it is convenient to use the term for all conditions in which there is such an excess. According to modern conceptions, hæmoglobin is changed to bilirubin by the cells of the reticulo-endothelial system, and the pigment so produced passes through the polygonal cells of the liver, being further slightly changed in the process, is excreted into the bile canaliculi, passes into the main bile channels, and so reaches the duodenum. On this basis, McNee[1] has formulated a simple classification of jaundice: (1) Hæmolytic, in which bilirubin is formed by the reticulo-endothelial cells in quantities greater than the polygonal cells can excrete; the stools are deeply pigmented. (2) Toxic and infective, in which there is damage to the liver cells and the excretion of a normal amount of bile pigment is prevented. (3) Obstructive, in which blockage of the bile passages prevents bile from reaching the intestines; the bile ducts become distended; bile capillaries are ruptured and bile is absorbed into the blood stream; the stools are acholic and the urine contains bile.

Well defined examples of each of these types are frequently encountered, but there are many others in which a combination of the processes occurs, and accurate diagnosis may be a matter of great difficulty. In passing through the polygonal cells of the liver, bile pigment is modified and van den Bergh's reaction serves to differentiate the two types of bilirubin; before such modification an "indirect" reaction is obtained, afterwards, a "direct" reaction. When the latter type exceeds a certain concentration in the blood it passes through the kidneys into the urine. The threshold of the kidneys for the former type is much higher and it is doubtful if in clinical cases bile ever appears in the urine.

Hæmolytic jaundice.—This is met with in various conditions, in all of which there is an excess of bilirubin in the blood, and in the majority of cases at some time there is staining of skin, mucous membranes and sclerotics. Bile appears in the stools, usually in amounts greater than normal; the urine contains excess of urobilin, but no bile pigments; in uncomplicated cases bile salts are not present. The jaundice is seldom deep and never of the extent which might be expected from the colour of the blood serum, which gives an "indirect" reaction to van den Bergh's test only.

The commonest example is the jaundice of the newly born, in which the fœtal type of red cells is rapidly broken down to be replaced by cells of the adult type. The jaundice never appears before the second day and never affects the health of the infant. It does not require any treatment.

Not to be confused with this is icterus gravis neonatorum, a condition hæmolytic in origin, usually becoming manifest within twenty-four hours, often occurring in a family in which previous cases have proved fatal, and frequently associated with anæmia, which may be profound. It is rare, but when enountered requires urgent treatment by injections of human serum or by transfusion.[2]

Acholuric jaundice is described as occurring in two types, familial and acquired, but their distinction is of purely academic value. The condition is associated with a diminished resistance of the red cells to hypotonic saline solutions and enlargement of the spleen and frequently of the liver; the latter organ is smooth and not hard. The degree of jaundice varies from time to time, and with it the size of the spleen and liver. In some cases the icterus is of considerable intensity, in others it may only be discovered in the course of a routine examination of the members of an affected family. Exacerbations tend to occur during the course of intercurrent illnesses and after the administration of anæsthetics, and the condition may be first discovered during such an exacerbation. The stools are deeply pigmented and the urine tends to be dark from excess of urobilin, but not from bile. There is a great tendency to the formation of pigment stones; and these, together with the associated inflammation, may lead to obstruction of the bile passages and a consequent superimposed obstructive jaundice. The excessive hæmolysis can be prevented by splenectomy, but it is doubtful how far this affects the underlying abnormality of the red cells; it certainly does not affect the course of the disease in the next generation. The mortality of splenectomy for the condition, as published by W. J. Mayo[3] in 1926, was 5·5 per cent., and it is perhaps unnecessary to insist that patients who have not any symptoms other than slight jaundice do not require any treatment; it is only when health is definitely affected that splenectomy should be recommended.

The icterus of pernicious anæmia is another example of hæmolytic jaundice. Similar jaundice may occasionally be found during the course of cœliac disease and in infections with *Dibothriocephalus latus*.

During the course of a septicæmia, a hæmolytic jaundice may occur, though in the majority of these cases the liver cells are also affected by the toxins, and the stools may be pale. Rarely, following a blood transfusion, hæmolytic jaundice may occur, even when no obvious fault can be found in the grouping of the blood of patient and donor. The condition may come on quite suddenly some time after an apparently successful transfusion. Often the patients do not appear ill, though at times they are peculiarly apprehensive. The kidneys are also affected and the patients usually die of anuria. If jaundice occurs after a transfusion, it is imperative that immediate steps be taken to produce diuresis. Fluids should be given freely by the mouth and the urine rendered alkaline. If these steps are not immediately successful, a 5 per cent. solution of glucose in normal saline should be given by a continuous intravenous drip.

Toxic and infective hepatic jaundice.—Jaundice occurs in a large number of conditions in which the liver is primarily affected. In some of these the bile canaliculi and ducts are involved as well as the parenchymatous cells, and it may be very difficult to differentiate them from cases starting with obstruction in which there is a secondary disorganization of the liver cells. The commonest example of the infective type is the so-called catarrhal jaundice. It occurs sporadically or in small epidemics, the virus probably gaining access to the body through the upper respiratory tract. It usually starts with malaise and a slight rise of temperature, often with pain in the epigastrium, and vomiting. As the liver enlarges there is, as a rule, tenderness over that organ. The spleen is enlarged in a fair percentage of cases. Jaundice appears first in the eyes, the intensity varying greatly in different cases. The urine contains bile pigments and salts, and frequently during the first few days small amounts of albumin, casts, and even blood. The stools are pale, partly due to diminished or absent bile-pigment, partly to the excess of fat consequent on the absence of bile salts from the alimentary tract; they are frequently offensive. The disease usually runs a benign course, though the general well-being of the patient may suffer for many months. Rarely, a subacute or acute necrosis of the liver may develop, and this should always be suspected in a case in which, after subsidence of the jaundice, the pigmentation again deepens. The patient should be kept in bed during the earlier stages and given a simple diet from which fats have been eliminated and which contains a liberal allowance of sugar. Magnesium sulphate is usually sufficient to overcome any constipation. Small doses of alkalis may help to prevent irritation in the urinary tract. Any increase in the depth of jaundice after the first subsidence, especially if associated with mental changes, a dry brown tongue, or a tendency to hæmorrhages, calls for energetic treatment with calcium gluconate given intravenously in doses of 10 c.cm. of the super-saturated solution twice daily, and with intravenous injections of 5 per cent. glucose in saline, with which should be given small doses of insulin.

Spirochætosis icterohæmorrhagica occurs sporadically or in small epidemics. It commences with pyrexia, headaches, herpes labialis, muscle cramps, injection of the conjunctivæ and albuminuria. Jaundice usually appears on the fourth or fifth day, and within a few days hæmorrhages occur and the patient may become delirious. The pulse becomes weaker and death may occur at this stage. At the end of the second week, the jaundice rapidly subsides, leaving the patient wasted and weak. About the same time, it is common to find a return of pyrexia, often to a greater height than at the onset; this fever may persist as long as three weeks. During the first week, the spirochætes are present in the blood stream and may be demonstrated by the inoculation of guinea-pigs; during the third and fourth weeks, the organisms are present in the urine. The liver is not enlarged to any marked extent, and the constipated stools usually contain bile. It is important to note that jaundice only occurs in about three-quarters of the cases (Stokes, Ryle and

Tytler[4]). Cases have been treated effectively with a specific serum; management otherwise is on lines similar to those suggested in the treatment of "catarrhal jaundice." I have recently seen a somewhat similar case ending in subacute necrosis after several months' illness, probably due to infection contracted from a fowl. Infective jaundice may occur during the course of other diseases, for example in enteric fever.

Jaundice is associated with the toxic necrosis of the liver which may be associated with pregnancy toxæmias, or result from the administration of certain drugs, e.g. atophan and novarsenobillon. In the case of drugs, it is important to note that the hepatic symptoms may occur early after their administration, or only after the lapse of a considerable interval of time, during which the drug may have been administered repeatedly without apparent ill effects. The early symptoms are often indistinguishable from "catarrhal jaundice." After withdrawal of the source of toxic absorption, the disease may follow a benign course. On the other hand, the process of necrosis may continue, marked by cerebral symptoms, such as headache, depression, terrors, extreme restlessness, twitchings, delirium and coma. In severe cases the liver is small, though in the early stages an enlargement may have been noticed. The urine contains large amounts of bile, and frequently blood and casts. The fæces are pale, unless changed blood is present in quantities sufficient to mask the absence of bile pigment. In the final stages numerous hæmorrhages occur. The temperature is often raised, but may be subnormal till near the end, when it frequently rises sharply. The pulse rate usually becomes more and more rapid. Late in the disease, treatment is probably unavailing, but in the earlier stages is on the lines suggested for the treatment of threatened necrosis in "catarrhal jaundice." In arsenical poisoning it is usual to give sodium hyposulphite, but it is doubtful how far this influences the course of the liver condition. The clinical course of the disease is closely simulated by the fatty degeneration of the liver which occurs in other toxic processes, such as phosphorus poisoning; in these cases the liver is enlarged.

Biliary cirrhosis usually occurs in patients under thirty years of age, though this is by no means invariable. The onset of jaundice is usually very gradual, with "attacks" during which the liver enlarges and the jaundice deepens, subsiding in the intervals, but never quite to the degree before the "attack," the disease being thus slowly progressive. During the "attacks" there may be pain and tenderness over the liver, occasionally severe; the temperature may be normal or considerably raised; the amount of bile in the stools is often decreased. The picture may simulate that of cholecystitis, but the gall-bladder is not distended, nor is there maximum tenderness over that organ. Sooner or later the liver becomes enlarged and firm to the touch. The spleen may be considerably enlarged; often it is not palpable in the early stages. In the majority of cases the previous history makes the diagnosis clear, though as Graham, Cole, Copher and Moore[5] emphasize, long-standing infection of the gall-bladder and ducts may lead to an ascending cholangitis and consequent biliary cirrhosis. In such cases, X-ray examination of the gall-bladder after administration of an opaque dye may be of considerable assistance. It is probable that the majority of cases of biliary cirrhosis are due to a "hæmic intoxication" (Rolleston and McNee[6]), and every effort should be made to find a septic focus, especially in the nasal sinuses or at the roots of teeth. Early attacks are often diagnosed as catarrhal jaundice, though at this stage bile pigment is not usually so obviously reduced in the stools. Other cases are reported as acholuric jaundice "with normal fragility of the red cells." The course of the disease is usually prolonged, the patient gradually becoming thin and in "poor health." Resistance to infection is lowered, and it is frequently to some intercurrent infection that the patient succumbs. In other cases, the condition slowly progresses to a cholæmia. Van den Bergh's reaction varies: at times an indirect reaction only is obtained, at others it is biphasic. Clubbing of the fingers and xanthomata may occur. In treatment it is essential to deal energetically with any toxic focus, and fluids should be given liberally to aid in the elimination of toxins. Drugs and anæsthetics which might exert a toxic action on the liver should be avoided as far as possible. For the same reason, pregnancy is undesirable. Alcohol and highly spiced foods should not be taken. Calcium gluconate may be tried in doses of one drachm thrice daily with food. Exposure to sudden changes of climate has appeared to precipitate attacks in some cases. Intestinal fermentation may require careful regulation of the diet. Later in the course of the disease, itching may be extremely troublesome: locally, preparations containing menthol often afford the greatest relief, and good results have been claimed for injections of pilocarpine or of atropine (Rolleston and McNee[7]). When an ascending infection is suspected, drainage of the gall-bladder may be justifiable. In the later stages of the disease little can be done to prevent a fatal termination. A form of biliary cirrhosis is associated with the atresia of the bile ducts, occurring in the newly born. In portal cirrhosis, jaundice is usually late and only a minor symptom.

In chronic heart disease, in association with the chronic venous congestion, degenerative changes in the liver cells may lead to icterus. In some cases the stools become pale. Van den Bergh's reaction gives varying results.

In a case recently under my care an embolism in the lower lobe of the right lung was associated with extreme pain and tenderness in the right upper quadrant of the abdomen. This, together with nausea, vomiting, an enlarged tender liver, pale stools and jaundice, had led to a diagnosis of acute cholecystitis. After admission to hospital, the presence of other signs of cardiac failure, a pleuritic rub at the base of the right lung, and the fact that during expiration the fingers could palpate deeply in the region of the gall-bladder without increasing the pain, rendered the true diagnosis apparent.

It should be borne in mind that in acute cholecystitis it is not uncommon to find signs at the base of the right lung associated with inflammation below the diaphragm, and that in chronic cholecystitis extensive myocardial damage may be found. Coronary thrombosis may lead to similar confusing symptoms.

Obstructive jaundice.—This may be due to obstruction within the lumen of the ducts, to pathological conditions in the walls, or to pressure or traction of the ducts from without. The commonest cause of obstruction is from stone. In the case of a stone in the cystic duct, jaundice is only present when inflammation extends beyond that duct. In such cases there may be hydrops of the gall-bladder, though the tenderness and rigidity in the right upper quadrant may make palpation very difficult. Pain, acccompanied by nausea and vomiting, is usually severe in the region of the gall-bladder itself or referred to the angle of the scapula or to the lower thoracic spine. There is a moderate rise of temperature. The stools are pale; the urine is deeply stained with bile. Itching of the skin often gives rise to great discomfort. The pulse rate is frequently slow. In the case of stone in the common duct, there is usually a long history of cholecystitis, and consequently the gall-bladder is usually small and fibrotic. Complete obstruction with resulting jaundice is probably associated with inflammatory thickening of the walls. As the swelling subsides, or it may be with a movement of the stone, the ducts become patent and the jaundice subsides. With the typical symptoms described by Charcot[8]—*intense* pain, fever, rigors, sweating and jaundice, together with a slight tender enlargement of the liver and often an enlargement of the spleen—the diagnosis may be sufficiently obvious, but often slight jaundice remains between the attacks, which may not be so severe, and then the condition may closely simulate that of biliary cirrhosis. The degree of leucocytosis during the attacks may help in differentiating the conditions. The liver tends to be firmer to the touch in biliary cirrhosis, but in long-standing cases of jaundice due to gall-stones, there is often a chronic inflammation of the liver, with a resulting cirrhosis spreading around the ducts. Mental disturbances are often marked in biliary cirrhosis and there is often much greater lassitude and poorer general health between the attacks. Though pathologically the conditions can be differentiated, clinically it may be almost impossible. Liver function tests do not give evidence sufficiently clearly-cut to be of real value. Meulengracht[9] recently suggested the use of glucose tolerance tests in which the observations are extended over several hours, but, as he concludes, the results rather encourage further work along these lines than offer immediate help. In both cases, during the attacks, an opaque dye may not be excreted by the liver; between the attacks the test may be of the utmost value. In doubtful cases operation alone may clear up the diagnosis, and, even when stones are absent, evidence of cholecystitis may suggest an ascending inflammation as a cause of the cirrhosis, and drainage of the gall-bladder may offer most hope of relief.

Jaundice, associated with colic and fever, sometimes recurs after operation for stone; this may be due to a stone remaining or may be associated with scarring of the ducts; in the latter case there is often a history of a profuse discharge of bile from the wound after the operation. Only very rarely is operation indicated during the attack of colic. The jaundice is usually *intermittent*, and even when, from a history of repeated attacks or from considerations of associated cholecystitis, operation is thought desirable, it is wise to wait for a few days in the hope that the jaundice will subside. Graham's test,[10] estimating the retention of phenoltetraiodophthalein after intravenous administration, associated with skiagrams of the gall-bladder, may give very valuable information, both as to diagnosis and as to operative risk. If undue retention of the dye is found, measures such as those advocated above in discussing necrosis of the liver should be undertaken, the test being repeated at a later date. When operation must be undertaken in the presence of jaundice, the administration of calcium gluconate intravenously twice daily probably helps to minimize the liver damage and assist in preventing the abnormal tendency to bleeding. Some authorities prefer the injection of 5 to 10 c.cm. of a 10 per cent. solution of calcium chloride intravenously for several days prior to operation. In all cases the coagulation time of the blood should be carefully watched. Transfusions have been advised for the same purpose, but unusual difficulty may be found in " grouping " the blood, and the procedure should never be adopted unless the donor's and the patient's blood have been directly tested against one another for agglutination. This should be done before any operation on a jaundiced patient in case an emergency should arise. The presence of urea or phosphate retention in the blood, or of albuminuria, should make one hesitant to transfuse a jaundiced patient.

According to Millet,[11] jaundice occurs in cholecystitis in 14 per cent. of cases, in the majority associated with stones. When the jaundice progressively deepens in cases with a past history of cholecystitis, there is the probability of malignant disease. Laparotomy may be necessary in order to establish a diagnosis and should be performed in doubtful cases. In cases of growth in the wall of the ducts, progressive jaundice and its associated symptoms, e.g. itching, may for a considerable time be the only complaint. The stools are pale, except when melæna is present. There is progressive weakness, but pain is only occasionally present. The liver is enlarged and smooth, and in about half the cases the gall-bladder is palpable. The duodenal contents usually contain pancreatic ferments. Primary carcinoma of the head of the pancreas gives rise to very similar symptoms and is more common; it is more likely to prevent pancreatic ferments from reaching the duodenum. A chronic inflammatory condition of the head of the pancreas may be associated with chronic cholecystitis and may closely simulate malignant diseases, even at operation.

In obstruction by malignant tumours at the ampulla, Rolleston and McNee[12] draw attention to the tendency for the jaundice to be intermittent; to the more probable presence of infection with attendant fever, and to attacks of diarrhœa. Although the diagnosis of malignant disease of the ducts may be regarded as probable, the misery of the patient, with itching controlled with difficulty even by morphine, may make operation desirable with the object of draining the bile passages above the point of obstruction, either into the alimentary tract or to the exterior. In other cases, where there remains a possibility of an impacted stone or of a chronic inflammation of the head of the pancreas, laparotomy alone may decide whether the condition is amenable to surgical cure. On rare occasions, obstruction may be due to the presence of parasites within the ducts. Jaundice may be associated with obstruction due to glands in the portal fissure, or, more rarely, with pressure or traction due to pathological states of neighbouring structures. Malignant disease of the liver as a cause of jaundice seldom gives rise to difficulty in diagnosis.

In conclusion, it should be stressed that in every case of jaundice in which operative procedures are deemed expedient, great care should be taken in choosing the best time for such interference. When jaundice is not constant, it is better to operate during an intermission. When liver function is poor, steps should be taken to improve that function as far as possible; the retention of phenoltetraiodophthalein will probably serve as the best index. The clotting time should be carefully studied, and any delay treated. In hæmolytic jaundice, in which splenectomy may be indicated, transfusion may be of the utmost value.

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A NEW METHOD OF TREATING CŒLIAC DISEASE

By ERIC PRITCHARD, M.A., M.D., F.R.C.P.
Medical Director, the Infants Hospital; Pædiatrician, Queen Charlotte's Maternity Hospital.

VIEWS with regard to the etiology and pathogenesis of cœliac disease have changed very much of recent years; whereas it was generally regarded as due to some congenital defect of the liver or pancreas, and as such more or less incurable, it is now more often considered to be due to some defect in absorption. But in spite of these changes of opinion with regard to the causation of the disease, the dietetic treatment at least remains very much what it has always been, namely, the restriction of fats, and the strict limitation of carbohydrate foods of all kinds, including vegetables and fruits.

In this article I propose to give the details of a method of treatment which differs essentially from that generally practised, and for that reason I must offer a number of explanations of the rationale of the method, which may at first sight appear to be somewhat unnecessary and redundant. I strongly suspect that cœliac disease in the main is due to bad feeding, and especially to an insufficient supply of the essential vitamins during early babyhood, particularly vitamin B. McCarrison long ago suggested that vitamin deprivation predisposed to arrest the development of the alimentary tract, and I think there are grounds for believing that the etiology of cœliac disease is of very much the same nature; but whether or no an avitaminosis is concerned in initiating the early stages of the disease, I am convinced that it is often responsible for its perpetuation by reason of the methods of curative treatment usually adopted.

The rationale of the line of treatment to be presently described is based on the assumption that the primary cause of the disease is an actual defect in the functions of absorption, which may or may not be associated with a general atrophic thinning out of the mucous membrane of the bowel, and also with considerable dilatation of both the large and the small intestines. Although after death a definite organic lesion cannot, as a rule, be discovered to explain defects in absorption, the thin parchment-like appearance of the bowel wall almost invariably found in fatal cases that have been submitted to necropsy, and the great dilatation both of the large and small bowel, are constant and striking features which seem to offer a good explanation of the defective function of absorption. The classical symptoms of cœliac disease are quite compatible with this assumption, and this is particularly true of the characteristic stools which are bulky, light coloured, porridge-like and offensive. The bulkiness is obviously due to the defective absorption; the paleness to the presence of excessive fat; and the offensiveness to the decompositions and fermentations which invariably take place in unabsorbed residues.

The slow rate of growth and the general infantilism are explicable on the grounds of the starvation which necessarily results from the impaired absorption of food products. The evidences of osteoporotic and rachitic changes in the skeletal system, and indeed also the tetany, are also easily explicable on the grounds of defective absorption of both fat-soluble vitamins and calcium. The usual method of treatment is to limit strictly the intake of fats, cereals, vegetables and fruits. The fats are limited because of the greasy character of the stools. The carbohydrates are limited to avoid fermentations, and the vegetables and fruits for the reason that both tend to increase the frequency of the stools. The consequences of this line of treatment are that the diet is essentially confined to protein or nitrogenous forms of food. To my mind all these restrictions are contra-indicated and subversive of rational treatment, for the following reasons :—

In the first place, fats should not be restricted, for they constitute under normal conditions one of the most favourable sources of roughage, and ensure a solid consistency of the stools. The best base for solid stools is undoubtedly some insoluble soap. This is the natural solid basis of all normal infantile stools, for there is no other source of roughage in a milk diet. For some reason or other, there appears to be a most unjustifiable suspicion of soap stools. They are generally regarded as possessing some pathological property or significance. There is, however, no better or more harmless basis for a solid stool than one of the insoluble soaps—that is to say, a stearate, palmitate, or oleate of magnesium or calcium, but such insoluble soaps cannot be formed in the bowel unless the food contains an adequate, or, as some might say, an excessive quantity of fat. Further, such fat must be properly digested, that is to say, it must be " split " into its component elements, glycerine and fatty acid, by some ferment such as lipase provided in the pancreatic secretion. Secondly, there must be sufficient calcium or magnesium in the food to supply the necessary base for the formation of the insoluble soap.

If fats are eliminated from the cœliac's dietary, soaps cannot be formed in the bowel, and there can be no good basis for a solid stool. Neither is it likely that insoluble soaps will be formed in sufficient amount if the ordinary sources of calcium—namely, milk, vegetables and fruits—are restricted or excluded from the diet. My treatment differs essentially from that usually employed in that so far from requiring a restriction of fat in the food, it demands a very considerable amount of it, and further involves, as a rule, the independent administration of additional calcium.

The stools of cœliacs should be chemically examined to ascertain if the fat present in them exists in the form of neutral fat, fatty acid, or soap. The presence of any considerable quantity of neutral fat, that is to say, unsplit fat, is a definite indication for the oral administration of some pancreatic preparation. The fatty acids which result from the splitting of neutral fats and are not absorbed can be neutralized by any available base, such as sodium or potassium present in the intestinal contents. Calcium and magnesium are not the only bases available for this neutralization; but if union takes place between the fatty acids and either sodium or potassium, the resulting soap will be a soluble and not an insoluble one, and hence will not impart any solidity to the stool. In connection with this, I would like to throw out the suggestion that the familiar frothiness of the stools in cœliac disease is not always due, as is generally supposed, to the whipping up of the fæcal material with some gas, such as methane or CO_2 generated in the fermentation of carbohydrate food. It may equally well, or more reasonably, be attributed to the lather caused by the agitation of potassium or sodium soaps. To prevent the formation of such soluble soaps the presence of an adequate amount of calcium in the stools is a necessary corollary.

Fermentation of carbohydrate food must inevitably occur if there happens to be any excess of this food element, that is to say, if more is consumed than can be absorbed, but, on the other hand, of all the products of digestion those which are most easily absorbed are the mono-saccharide sugars—the normal products of carbohydrate digestion. Moreover, if cœliacs are fed exclusively on a sugar diet for a short time, as is necessitated by the carrying out of my system of treatment, frothiness of the stools will entirely disappear. For this, and for other reasons, I do not regard it as an essential part of the treatment specially to limit or restrict the supply of carbohydrate food, although very strict limitation of the total quantity of all the different food elements, including, of course, both soluble and insoluble carbohydrates, is very essential if good results are to be obtained.

As regards the restriction of fruits and vegetables, I would point out that these, apart from milk, must serve as the almost exclusive sources of both vitamins and mineral elements, and that without these it is impossible under any conditions to maintain normal nutrition. My method of treatment includes a fair representation of both fruits and vegetables.

Finally, as regards protein foods which, in the form of milk, eggs, and meat, are generally allowed to constitute the main proportion of the diet, in those cases in which ordinary methods of treatment are adopted. In my treatment, they are definitely restricted, owing to their liability to undergo decomposition changes in the bowel, and thereby increase the offensiveness of the stools and the dangers of intestinal intoxication which is the chief cause of the serious troubles of cœliac disease—the wasting, the nervous symptoms, and the relapses.

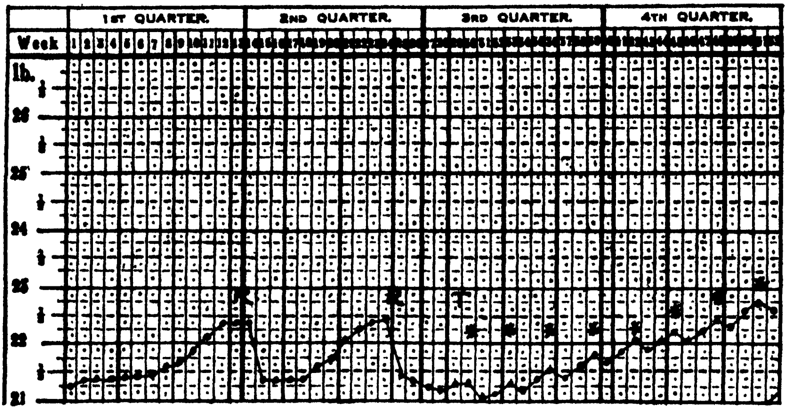
The treatment of cœliac disease, if it is to be rational and successful, must take into account the atrophic and atonic condition of the whole of the alimentary tract. Since owing to these disabilities comparatively little food can be absorbed, it is necessary to conserve for the essential purposes of nutrition the very limited amount of nutritive material which is capable of reaching the blood stream. For this reason, all unnecessary loss of heat should be avoided, by keeping the child warm and well clothed. Further, all wasteful output of energy should be obviated by limitation of exercise to the lowest possible point, at least during the acute phases of the disease, even to the extent of keeping the child immobilized in bed should extreme measures be justified.

Frequent relapses and acute exacerbations of the symptoms are the almost universal and unhappy experience of those who have to treat cases of cœliac disease. These relapses occur at variable periods, sometimes every few months, sometimes oftener. They are particularly liable to occur after a return home from what may have been considered a very satisfactory stay at the seaside, or during periods of dentition. The exacerbations of the symptoms come on so suddenly, at such unexpected times, and for so many years, that more than one writer on the subject has claimed that the disease is practically incurable. I believe that these relapses are mainly due to the cumulative effects of the intestinal toxæmia, the chief incidence of which falls on the detoxicating functions of the liver. The limit of tolerance of the usually small and possibly ill-developed liver of the cœliac is soon reached if serious calls are made upon any of its functions, more especially on its detoxicating function, possibly one of the most important of its many duties. When these limits are reached and the buffering action of the liver is eliminated, the full incidence of the toxic substances now circulating freely in the blood falls on the unprotected nervous system, and thus is brought about the much dreaded relapse.

Anorexia, which is one of the most obvious of the effects of this toxæmia, seems to bring about a natural cure, for the child refuses food, the sources of the intestinal toxæmia are dried up, and the detoxicating functions of the liver are once again restored, and so the history is repeated, periods of recuperation alternating with periods of relapse. A weight chart graphically demonstrates the history, the curve rising with each period of recovery, and falling again with each exacerbation. It was owing to my despairing examination of many such charts, coupled with my interpretation of the causation of the relapses, that the idea occurred to me to anticipate Nature's method of cure by substituting at regular intervals short periods of starvation, and thus to give the liver opportunity for rest and recovery *before*, and not *after* the breakdown. Moreover, rather curious support was lent to this theory by the following incident.

One of my patients, a small boy three years of age, who had been treated for about two years for cœliac disease at a children's hospital in London, was brought to the Infants Hospital by his mother, who was not satisfied with the progress the child had been making. After a short stay in hospital, I transferred him to our Convalescent Home at Burnham, but had to discharge him shortly afterwards owing to the outbreak of an epidemic of whooping cough to which I feared he might fall a victim. In spite of this precautionary measure, the child actually developed whooping cough some ten days after he had returned home. I quite expected to hear that there had been a set-back to his progress, but three months later, when he was again brought to the Infants Hospital for examination and report, I found, greatly to my surprise, that there had been no interruption to the improvement started at Burnham, but rather the contrary—the boy had put on even more weight than heretofore, and was looking extremely well. Rightly or wrongly, I ascribed this happy consummation to the repeated vomiting from which he had suffered during the course of the attack, and to the relief which this had afforded the liver. In fact, I believe that the vomiting had just the same effect as the enforced periods of starvation which had formed part of the institutional treatment.

The system of periodic starvation, which now is always a routine part of the management, provides that on the evening before the treatment starts, once in every fourteen days, a dose of castor oil is administered, and during the actual day of starvation all food is suspended except a practically unlimited supply of orange juice, glucose and water. Since I instituted this method of treatment, to which the name " The Feast of the Passover " has been facetiously applied at the Infants Hospital, the familiar relapses have practically ceased to occur. The weight charts of all the cases tell the same tale; there is a continuous though perhaps slow rise in the weight, which is only interrupted during the fortnightly periods of fasting in quite an insignificant degree. The accompanying chart shows very well the typical curve of a case treated by this method. I do not consider any case a genuine cure unless a whole year has intervened since the commencement of treatment without a definite relapse. The great difficulty, however, is to prevent the mothers of these children relaxing the precautions which my method of treatment demands.



Weight chart of cœliac case (three years old). Before and after treatment. R. Indicates relapses before treatment. T. Indicates commencement of treatment. * Indicates days of starvation.

As regards food, owing to its defective absorption, relative starvation cannot be avoided, and consequently the adequate filling of the dilated bowel becomes difficult. It is essential, therefore, to fill up the intestine with a considerable amount of roughage, or food of little nutritive value which is not easily decomposed in the bowel. As I have already referred at length to the value of insoluble soaps as roughage, it is unnecessary to labour this point further, but apart from them the only other source of roughage is vegetable fibre or cellulose. This can, of course, be provided by most vegetables and fruits, but care should be exercised in the selection of these, since hard cellulose residues or excessive acidity may prove irritating to the bowel wall and aggravate the diarrhœa. For this reason raw apples, plums, raspberries, figs, currants, raisins, celery, beetroot and carrots (unless very well boiled), should be avoided. The best vegetables are spring cabbage, turnips, vegetable marrow, brussels sprouts and Jerusalem artichokes, while the best fruits are bananas, owing to their very high cellulose content. Bananas should, however, always be given mashed, as otherwise, owing to their slippery composition, they are liable to be swallowed whole. To show how well bananas can be tolerated, I can instance the case of a small patient of mine, four years of age, whose mother interpreted my advice that the child might have unlimited quantities by giving him no fewer than twelve every day. On this diet the child did exceedingly well, but in general practice I would recommend that not more than four bananas should be given a day to a child of this age; they must, however, be ripe and in good condition. Next to bananas, I consider oranges, melons and grapes to be the most suitable fruits; apples should be baked or otherwise cooked.

The following detailed account of the method of dieting which I employ may be useful :—

On waking, the juice of an orange, a tablespoonful of glucose, and one or two nutritive salt triturettes. (Parke, Davis & Co.)

Breakfast.—Six oz. of boiled and unskimmed milk, flavoured with cocoa or ovaltine if thought desirable. Two tablespoonfuls of some cereal preparation, with a teaspoonful of bemax and two oz. of milk (in which the prepared chalk may be administered). One slice of toast, with butter or jam (without seeds or skins), jelly or potted meat. Banana, baked apple, stewed prunes or apricots.

Dinner.—Three oz. of bone and vegetable soup. One oz. of meat, brain, liver, sweetbread, tripe, fish, or egg. Two tablespoonfuls of vegetables, such as cabbage, spinach, cauliflower, turnip, Jerusalem artichoke, vegetable marrow, or boiled onion. Two tablespoonfuls of milk or steamed pudding with fruit.

Tea.—Eight oz. milk. Plain cake, biscuit, toast, or pulled bread, butter and jam (without seeds and skins), or marmite. Banana or stewed fruit.

Supper.—Supper is not recommended, but if thought necessary should consist of calf's foot jelly, or 3 oz. broth.

Unfortunately, no drug has any specific influence on the course of the disease, but rational therapeusis involves symptomatic treatment, and should be directed to the following points : (1) The prevention of diarrhœa or loose stools; (2) the prevention of acidosis, mineral depletion, osteoporosis, rickets, tetany and anæmia; (3) the prevention of the usual results of intestinal intoxication.

As regards the first of these requisites, in order that, as already stated, the necessary conditions may be provided for the formation of insoluble soaps in the stools, care must be taken that the neutral fats provided in the food are broken into their constituent elements, namely, fatty acids and glycerine, through the agency of fat-splitting ferments provided by the pancreatic secretions, or by the succus entericus. To ensure that these conditions are fulfilled, the stools must be submitted to chemical analysis to ascertain whether the fat which they contain exists in the form of neutral fats, fatty acids, or as soaps. If the major portion consists of neutral fats, if, in fact, there is steatorrhœa, the indication is to provide an adventitious supply of some lipase ferment by the mouth. This is most conveniently done by giving at each meal one or two zymine pepules. If there should happen to be an excess of unsaturated fatty acids, indicating a deficiency of neutralizing bases, but at the same time an efficient fat-digestion, there is no occasion to give any additional fat-splitting ferment, but there is very obvious need for the supply of calcium base. My practice is to give under such conditions prepared chalk to the extent of 40 to 60 grains at each meal, that is to say, some 2 or 3 drachms in the 24 hours, or in certain cases I give corresponding doses of lactate of calcium.

A frothy condition of the stools, although not proof of the presence of soluble soaps, nevertheless is a very strong indication. Under such conditions the loss of sodium and potassium bases must be counteracted by the administration of prepared chalk, which will act as a sparer. Excess of insoluble soaps present in the stools is also an indication for the giving of extra calcium base, in order that the body may not be depleted of lime, and thus lead to a condition of osteoporosis or cœliac rickets.

As regards the prevention of general mineral depletion, this can be assured by the administration of nutritive salts (Parke, Davis & Co.) every morning, together with the orange juice.

Although a brief reference has been made above to the prevention of intestinal intoxication, I would again insist that the main dangers connected with this eventuality are associated with the absorption of the products of protein decomposition in the bowel. If the nitrogenous elements consumed in the food are normally digested in the stomach and intestines and reduced to the condition of peptones and amino-acids, there is little room for that abnormal form of proteolysis which is the result of bacterial activity and the cause of this intoxication. Hence full attention must be given to the possibility of failure in either gastric or intestinal digestion.

In cœliac cases there is quite often some degree of hypochlorhydria, with attendant failure of peptic digestion. To discover whether or not this is the case, the gastric contents should be submitted to chemical examination, and if there is any evidence of a deficiency of free hydrochloric acid the defect should be made good by the oral administration of 5 to 10 minims of dilute hydrochloric acid at each meal, or by giving lactic-acid milk. Although there is no really effective intestinal antiseptic available for use, there can be no doubt that in cases in which there is an absence or deficiency of lactic-acid organisms in the stools, protein decomposition is excessive. This can possibly be prevented by the administration of lactic-acid organisms in the form of lactobacilline, one tablet after each meal, or by the use of sour milk.

Kaolin, given freely up to the extent of one or two drachms at each meal, may also help to adsorb a certain amount of the toxins formed by bacterial activity and serve as artificial roughage. Charcoal biscuits may be useful for the absorption of gas in cases with which there is abdominal distension due to carbohydrate fermentation. Abdominal pains are such frequent concomitants of the cœliac condition that they may require special treatment. For these, bismuth in the form of glycerinum bismuthi carbonatis is excellent; or in those cases in which there is an accompanying constipation, as is often the case when my method of treatment is adopted, there is nothing better than the combination of petroleum emulsion with glycerinum bismuthi carbonatis.

If fats are not excluded from the dietary, there is not, as a rule, any special necessity to administer either vitamin A or D independently of the food, but at the commencement of treatment, especially in neglected cases in which there has been for a long time a shortage in the supply, it is as well to give these vitamins for a short period in concentrated form. There is probably no better preparation than adexolin, which may be given in doses of 5 minims three times a day.

As this is the first occasion on which I have published the details of this new and decidedly unorthodox method of treating cœliac cases, I would most earnestly exhort all those who may feel disposed to give my system a trial to abandon any preconceived views they may hold as to the proper method of treating such cases, and approach the experiment with an entirely unprejudiced mind. Further, I would warn them not to anticipate immediate cures in long-standing cases, but to be satisfied if at first they see some slight amelioration of the symptoms, some slight increase in weight, some improvement in the stools, and a cessation of the serious relapses which usually punctuate the history of the disease. The main principles which distinguish my method of treatment from all others with which I am acquainted, lies not so much in connection with the lifting of the ban on the consumption of fats, which owing to its reasonableness should require little justification, as with the measures which are devised for the relief of the symptoms of intestinal intoxication by the routine limitation of protein foods, and their complete exclusion during the fortnightly periods of starvation.

DIFFICULTIES IN THE DIAGNOSIS OF DIABETES MELLITUS

By OTTO LEYTON, M.D., D.Sc., F.R.C.P.
Physician, the London Hospital.

IF any friend of mine had told me thirty years ago that I was unable to diagnose diabetes mellitus I should have felt offended and refused to believe him; if any one were to tell me so to-day I should agree with him and admire his candour. The difficulties in arriving at a diagnosis may arise from the following facts: (1) The renal threshold for dextrose not only differs in different individuals, but varies from time to time in the same individual; (2) some individuals possess the average normal power of storing carbohydrate when eaten as starch and much less than the normal when the carbohydrate is ingested as glucose; (3) some individuals possess metabolisms which cannot store carbohydrate at the normal rate, but their metabolisms remain unchanged, even when a full load is placed upon them by an unrestricted diet over several years; (4) the deterioration of the metabolism which is the characteristic of diabetes mellitus does not progress regularly; temporary remissions may occur so that an individual who has presented the signs of diabetes mellitus may for a period appear to be quite normal.

Thirty years ago if a substance which reduced Fehling's solution was found in the urine all that the physician had to do was to satisfy himself that the reducing substance was really glucose, and not pentose, alkapton, lactose, maltose, lævulose, glycuronic acid, nor an excess of uric acid. "Glycosuria" was "diabetes mellitus." To-day many believe that if in addition to glycosuria they prove hyperglycæmia, they are justified in diagnosing diabetes mellitus; I trust that it will not be thirty years before that view is changed. It is true that all patients suffering from diabetes mellitus have hyperglycæmic glycosuria, but it does not follow that therefore all who have hyperglycæmic glycosuria have diabetes mellitus. Horses are quadrupeds, but all quadrupeds are not horses.

LOW RENAL THRESHOLD

The present-day term for glycosuria with a normal sugar content of the blood is ortho-glycæmic glycosuria, a condition with which the average practitioner is well acquainted. Many years ago this was not the case, and I well remember the reaction of a somewhat aged conscientious practitioner upon first hearing that negligible glycosuria existed.

He had brought a boy to me in whose urine he had found sugar; since I found that the patient passed sugar in his urine while the sugar content of his blood was quite low and the symptoms of diabetes mellitus were absent, I diagnosed a low renal threshold for dextrose and advised an unrestricted diet. I learnt from the father that in the waiting-room after leaving me, the practitioner apologized for having selected me as a consultant, adding that he was quite sure that I was mad, and implored the father not to allow his son to depart from a strict anti-diabetic diet. In this case the father and several cousins had the familial peculiarity of a low renal threshold.

The condition is fairly common, and nearly 2 per cent. of the glycosurics examined by me present this condition. The diagnosis is simple, because the sugar tolerance test when carried out with due precautions shows that in spite of the concentration of sugar in the blood not rising above 0·18 per cent., nevertheless sugar is present in the urine. As a rule the percentage of sugar in the urine is low, but I have seen several cases in which it has been as high as five, and one case in which it rose to eleven.

The first case of ortho-glycæmic glycosuria which came my way, several years before renal glycosuria had been described, occurred in a youth so thin that his father refused to take him out because he disliked being told that he must be starving his son. This patient was treated as a diabetic for quite a long time, until it became obvious that he was better on an unrestricted diet.

I do not consider a low renal threshold a great difficulty in the diagnosis provided that it be recognized that it does not preclude diabetes mellitus.

HYPERGLYCÆMIA FOLLOWING INGESTION OF GLUCOSE AND NOT OF STARCH

The peculiarity of hyperglycæmia following the ingestion of glucose and not of starch has been found in several of my patients. The description of cases will make it clear that unless special care had been taken they would have been diagnosed as suffering from diabetes mellitus and been placed upon restricted diets.

A man, aged 45, without any symptoms of diabetes mellitus, was sent to me because glucose had been found in his urine. Previous to his visit he had been upon an unrestricted diet liberal in carbohydrate and in energy, so that it was justifiable to assume that his pancreas had been well exercised.

[This is an essential before the application of a sugar tolerance test because the rested pancreas of some diabetics permits the more rapid storing of sugar than the rested pancreas of some healthy individuals. In other words, the normal pancreas works best when well exercised and fails to act after long rest whereas the diabetic's pancreas acts well after a long rest and fails to act when overworked. Any who doubt this can prove it upon themselves. Let them restrict their diet to 50 grams carbohydrate, 50 grams protein, and 25 grams fat per diem for four days and then take 50 grams of glucose in solution and they will find that a temporary hyperglycæmic glycosuria will develop.]

The patient was given 50 grams glucose dissolved in 200 c.cm. of water with the juice of a lemon, and the effect upon the sugar content of his blood noted. The sugar content of his blood at the beginning of the test was 0·17 per cent., but he had had breakfast that morning. At half-hourly intervals following the administration of the glucose the concentrations were 0·27 per cent., 0·32 per cent., 0·30 per cent., 0·24 per cent., 0·20 per cent., and 6 grams of sugar were excreted in the urine during the test. I diagnosed diabetes mellitus and admitted him to a home with the object of finding the correct dose of insulin for a diet of approximately 250 grams carbohydrate and 100 grams of protein and of fat. Cane sugar was excluded from his diet. On this diet sugar did not appear in his urine, and upon testing the blood from time to time no observation above 0·18 per cent. was recorded. Therefore he was submitted to a progressive carbohydrate test. The available glucose in his diet was reduced to 50 grams for three days and then raised to 150 grams for three days, and finally to 300 grams. During the first three days the urine contained 0·2 per cent. sugar, during the second three days a mere trace, and during the final three days none. During the final three days the sugar content of his blood did not rise above 0·15 per cent. The sugar tolerance test when repeated was identical in shape, but at 0·04 per cent. lower level.

It might have been expected that an individual who was unable to store sugar at the rate necessary to prevent glycosuria following the ingestion of glucose was really a very early case of diabetes mellitus, but this patient has not developed the disease after a period of three years of unrestricted diet.

Another case of a rather younger man who complained of weakness, but not of thirst nor polyuria was found to have glycosuria, and the sugar tolerance test carried out with all precautions, suggested diabetes mellitus. He was admitted to the London Hospital, where observations were carried out which proved to be a repetition of those of the case just mentioned. The sugar tolerance test was repeated and the earlier view confirmed. He was able to use 300 grams carbohydrate daily when presented as starch. I submitted this patient to a further test depending upon the phenomenon referred to earlier, namely, that a diabetic's pancreas after rest, works better than an exercised pancreas, while a normal individual's pancreas works better when exercised. These two tests showed that in this case the pancreas worked better when exercised and therefore I concluded that the patient was not suffering from diabetes mellitus, and the subsequent history has confirmed this.

STATIONARY HYPERGLYCÆMIC GLYCOSURIA

Two cases presenting this condition came my way about seven years ago under very different circumstances.

A woman, aged 30, told me that her brother suffered from diabetes mellitus and that it was her duty to test his urine from time to time. On one occasion she tested her own urine and found sugar. On consulting her local practitioner diabetes mellitus was diagnosed and she was referred to me. While on ordinary diet the sugar content of her blood rose to 0·22 per cent. after a meal containing 70 grams of carbohydrate and the sugar tolerance test resulted in a curve characteristic of mild diabetes mellitus. For reasons which I need not detail here, it seemed unwise to restrict the diet and she was told to eat whatever she liked and report in a year's time. Subsequent tolerance tests repeated at intervals of a year showed that her power of storing sugar varied, but that there was no evidence of progressive deterioration.

The second case was that of a man of the same age who had no symptoms but a considerable amount of sugar in the urine. When submitted to the sugar tolerance test the result was typical of diabetes mellitus; he was ordered a restricted diet and advised to report again later. After an interval of two years he sought advice for hæmoptysis and admitted that he had not kept to a diet during the past 22 months. Detailed examination of his chest failed to show any physical lesion. A repetition of the sugar tolerance test suggested that his power of storing sugar was no worse than at the previous examination, and yearly observations for five years proved that his power of storing sugar was not deteriorating.

If these two patients had adhered to rigid diets they might have been used to illustrate the advantage of treatment of diabetes mellitus by diet alone; no one would have known that they would have enjoyed even better health upon an unlimited diet. They might have been quoted as evidence against any one who had the temerity to assert that restricted diet alone was an unsatisfactory method of treating diabetes mellitus and that as soon as diabetes mellitus is established beyond doubt as the diagnosis, insulin should be prescribed.

A patient with this peculiarity came to see me a few months ago complaining of fatigue and loss of weight. She told me that she had been upon a restricted diet for more than nine years because she was suffering from diabetes mellitus, and that as a rule her urine was free from sugar. Since I hold the view that true diabetes mellitus is very rarely arrested by restricted diet, I asked her who had diagnosed her complaint as diabetes mellitus. She replied: "You, sir, at the London Hospital." The patient consented to come in for investigation, and we found that the sugar content of her blood rose to 0·22 per cent. for a short time daily, but for the rest of the day it was below 0·15 per cent., and that these estimations were the same whether her diet contained 50, 150 or 250 grams "G" per diem. I came to the conclusion that she was not suffering from diabetes mellitus, and she left the hospital on ordinary food, with orders to report again in one year's time.

OSCILLATIONS IN POWER OF STORING CARBOHYDRATE

The cases reported so far have been those which apparently would have been at least as well if allowed unrestricted diet all the time. I shall not define what I mean by diabetes mellitus at the moment, but let us assume that it is hyperglycæmic glycosuria which becomes worse if not treated. The words "becomes worse" are to be interpreted that the power of utilizing carbohydrate diminishes until the amount burnt falls so low that ketosis develops. This deterioration of the metabolism does not always progress steadily, in some cases it seems to leap forwards and rebound.

A man, aged 40, had had sugar found in his urine at Bogota and the sugar content of his blood had risen to 0·25 per cent. after 50 grams of glucose by the mouth. I was not furnished with details about the preparation of the patient for the sugar tolerance test, and when I found that the sugar content of his blood did not rise above 0·15 per cent. after 50 grams of glucose following 14 hours' fast, which had been preceded by a generous diet for a week, I concluded that he was not suffering from diabetes mellitus. The patient went to Paris, where he enjoyed the best of food and wines and returned three months later for further tests, which proved negative. Two years later he developed acute nephritis while in France and was placed upon a diet rich in carbohydrate, which led to glycosuria. A diabetic expert then submitted him to a sugar tolerance test, and although the sugar content of the blood rose to 0·22 per cent., he concluded that the patient was not diabetic. Two years later the patient needed 40 units of insulin daily to allow him to utilize a somewhat restricted diet.

My interpretation of this case is that while in Colombia the patient had a mild infection which led to the extremely mild diabetes from which he suffered, becoming temporarily worse. The infection passed and his power of storing sugar returned to normal for a time.

Occasionally the interval between the first suspicion of diabetes and the development of signs which place it beyond doubt does not extend over any long time.

A school teacher sought my advice because she was losing weight, became fatigued easily, and sugar had been found in her urine. She had been upon ordinary food and had eaten a meal with plenty of carbohydrate one hour before the consultation. Since the sugar content of her blood was 0·25 per cent., I decided to admit her to hospital for treatment. The long hospital waiting list delayed her admission for nearly two months, and then it was found that she was able to take ordinary food without developing either glycosuria or even hyperglycæmia. She left the hospital with orders to report again in six months, but long before that time had elapsed she returned because she had fallen a victim to influenza and an intense glycosuria had followed. Investigation showed that she then needed 20 units of insulin twice daily to utilize a diet of 30 calories per kilogram bodyweight per diem containing 150 grams of carbohydrate.

EFFECT OF BACTERIAL TOXINS

This case suggests a method of making a diagnosis in difficult cases, a method which I have used for a number of years in a few selected cases. In pre-insulin days

I had noticed that the injection of a vaccine led frequently to a temporary glycosuria, and it has been asserted that as few as one million dead *Bacilli coli communes* upon subcutaneous injection caused hyperglycæmia in a controlled diabetic. The concentration of sugar in the blood upon the production of pyrexia falls in the normal person and rises in the diabetic. In doubtful cases the attempt to immunize against typhoid fever or even the complications of a common cold may assist in arriving at a diagnosis provided careful record be kept of the effect upon the sugar of the blood.

DEFINITION OF DIABETES

I favour as the definition of diabetes: " A condition in which there is a deterioration of the metabolism, primarily that of carbohydrate and secondarily of protein and of fat. This alteration in the metabolism may proceed steadily, irregularly or fulminatingly, and may be arrested or even reversed by treatment." This definition accentuates the progressive character of the complaint if untreated. The only sure method of making the diagnosis is by obtaining evidence that the power of storing sugar is decreasing.

CISTERNAL PUNCTURE

By W. M. FELDMAN, M.D., M.R.C.P., F.R.A.S., F.R.S.E.

Senior Physician, St. Mary's Hospital, Plaistow.

> *Here quench your thirst, and mark in me*
> *An emblem of true charity ;*
> *Who, while my bounty I bestow,*
> *Am neither seen nor heard to flow.*
>
> W. Horne.

THE limpid, invisible and inaudible stream of cerebrospinal fluid which forms a water bed for the brain and spinal cord, protecting these structures from injury, and which also acts in a nutritive as well as an excretory capacity to the central nervous system, is derived from the blood as an exudation—probably secretory—from the choroid plexus lining the cerebral ventricles, which it fills. From the ventricles it finds its way, through the foramina of Magendie and Luschka in the fourth ventricle, into the subarachnoid space of the brain and spinal cord. As the result of the continuous formation of fluid by the choroid plexus, and its equally continuous re-absorption by the Pacchionian bodies (arachnoid granulations), into the cerebral venous system, the cerebrospinal fluid is in constant circulation—although it is " neither seen nor heard to flow." It, however, bestows its bounty on the clinician by affording him a means which is invaluable not only for diagnostic but also for therapeutic purposes. The subarachnoid space, situated between the outer arachnoid and the inner pia mater, is very small over the convexity of the brain—except in the sulci between the gyri. At certain parts of the brain, however, the subarachnoid space becomes large and deep, and each of these enlarged spaces of fluid is called a cistern. There are several such cisterns (or lakes), but the biggest, and from our point of view the most important, because the most accessible, is the *cisterna cerebello-medullaris*—which lies between the cerebellum above and behind and the medulla below and in front—and which, on account of its size, is called the *cisterna magna.*

The introduction of a hollow needle into the cistern, with the object of withdrawing some of the fluid, or/and introducing certain substances into the subarachnoid space, for diagnostic or therapeutic purposes, may sound a very dangerous and formidable operation, and indeed, compared with lumbar puncture, it undoubtedly is a much more hazardous procedure in the hands of those unfamiliar with the anatomy of the part. In reality, however, the operation is very simple, and with the exercise of reasonable care, can be performed by the practitioner of average competence, who is acquainted with a few elementary facts relating to the anatomy of this region. Indeed, some go as far as to advocate its universal adoption as a substitute for lumbar puncture. Thus, Castex and Ontaneda write: "*La ponction cisternale offre sur la ponction lombaire une si grande quantité d'avantages, qu'elle mèrite d'entrer dans la pratique quotidienne . . . et même . . . en remplacement de cette dernière.*" I do not go as far as that, but I believe that when the operation is indicated, it can be done by any careful practitioner who has previously done lumbar punctures, and who has thoroughly mastered the technique, without his necessarily delegating it to an expert. It is the object of this paper to enumerate the indications for the operation, to give a brief but adequate account of the anatomy of the cisterna magna, which will help the reader to understand the risks to be avoided, and then give the requisite details of the technique which will enable him to do the operation himself when the need arises. If the reader can also manage to see the operation done by an expert, or still better, practise it on the cadaver, before doing it on a patient, so much the better, but this is not absolutely necessary. My first cisternal puncture was done without having seen it performed or having done it on the cadaver, and I have carried it out a number of times since, without any difficulty or ill-results.

HISTORY

The historical development of our knowledge of the cerebrospinal fluid hardly comes within the scope of this paper. A few of the landmarks, however, in the evolution of the various methods of entering the subarachnoid space, will, I believe, not be out of place here. In 1885, Corning—as the result of experiments on dogs—injected some 3 per cent. of cocaine hydrochloride between the spinous processes of the 11th and 12th dorsal vertebræ, in a man suffering from "spinal weakness and seminal incontinence," and thus produced impaired sensation in his legs. He foresaw the possibility of spinal anæsthesia. As, however, Corning introduced his needle above the termination of the spinal cord, i.e. before its ramification into the cauda equina, it was regarded as too risky a procedure to be repeated. Four years later Essex Wynter described four cases of tuberculous meningitis from which cerebrospinal fluid was drawn by means of a trocar and cannula inserted into the subarachnoid space between the second and third lumbar vertebræ—after a preliminary incision of the skin. He called the operation "Paracentesis of the theca vertebralis." It is, however, to Heinrich Quincke that the credit is due of having in 1891 simplified the operation by introducing the needle into the space between the second and third lumbar vertebræ, without a preliminary incision of the skin. The usual space chosen is that between the third and fourth lumbar vertebræ, which is the widest, and lies in the transverse plane tangential to the highest points on the crests of the ilium. This procedure is the well known "lumbar puncture."

Theoretically, the ideal place for obtaining cerebrospinal fluid is one or other of the lateral ventricles, because it is there that the fluid is formed and is found in the greatest quantity; but to enter that chamber is, obviously, an undertaking of considerable magnitude in any person after the age at which the anterior fontanelle has closed—although in infants with open fontanelles this method of approaching the cerebrospinal fluid is certainly the easiest and is done without hesitation when the lumbar route is contra-indicated. Middeldorpf, in 1858, was the first to tap the ventricles in the living human being, and the operation is now done by means of a special small drill and needle under local ethyl-chloride freezing, without leaving any permanent hole in the skull or mark on the scalp (Purves-Stewart). This operation, however, definitely needs special surgical skill and, in any case, should be reserved for cases of inoperable cerebellar tumours for the relief of the severe headache and vomiting as well as the threatening blindness, and for the injection of air (or, as has recently been done, light lipiodol) into the ventricles for obtaining a radiogram of the contour of the ventricles (ventriculography) in the diagnosis of the positions of intracranial tumours.

The cisterna magna is the next largest collection of cerebrospinal fluid, and its drainage was first done by open operation by Parker, in 1893. As, however, it is not entirely enclosed within a rigid bony box, like the ventricles in the adult, but lies in front of the occipitoatlantoid ligament which is covered merely by soft structures, it was suggested by Quincke, in 1905, that it might be reached by puncture through the unincised skin, in a manner analogous to that of lumbar puncture, although he considered the operation too dangerous for him to attempt it. The first to puncture the cisterna magna in the living human being was Obregia in 1908; he called the procedure, "Suboccipital rachicentesis," and introduced the needle into the depression above what he called the spinous process of the atlas, but what was really the spinous process of the axis—as the atlas has not a spinous process, but only a posterior tubercle which cannot be felt through the soft structures. Obregia did not give any further details of the technique. The first to describe a detailed technique for cisterna puncture were Wegeforth, Ayer and Essick, of Baltimore, in 1919, and their technique, generally known now as Ayer's method—because it is Ayer who, since 1920, has written several papers on the subject—has been extensively used since then. Eskuchen, in 1921, described a slightly different method, although he chose practically the same point of entry for the needle. In 1928, W. Pires, of Brazil, chose, as his place of entry, the point of intersection of the line joining the tips of the two mastoid processes (the bimastoid line) with that joining the external occipital protuberance and the spinous process of the axis. In other respects his technique, i.e. the direction in which he guided the needle to enter the cistern, is the same as that of Eskuchen (*see* p. 625). Each of these methods is reasonably good, but has certain disadvantages to which I shall refer later. The best—because the most scientific, the most accurate and the safest— technique is that of Castex and Ontaneda, of Buenos Aires, as originally described by them in 1930. A slight modification of Ayer's method as used more than 5,000 times was described at the end of 1933, by Gilman and Kempf, but it does not possess the merits of Castex and Ontaneda's technique. In 1923, Sicard was the first to introduce lipiodol into the cisterna magna in order to localize a spinal tumour.

INDICATIONS

Cisternal puncture is called for in the following circumstances :—

(1) *When lumbar puncture is impossible,* owing to some spinal deformity.

(2) *When lumbar puncture repeatedly fails to yield*

fluid.—Such " dry " puncture, though generally due to faulty technique, may be due to occlusion of the subarachnoid space, the result either of adhesions following inflammation or of tumours above the puncture level.

(3) ***When the fluid coming through the lumbar puncture needle is mixed with blood,*** as the result of injury to the venous plexus in the vicinity. The blood tends to clear up in about three days, but if a specimen of the fluid is needed immediately for chemical and cytological examination, the cisterna route should be resorted to because not only is the epidural venous plexus less abundant in that region, but if the operation is done with the patient in the sitting posture, the venous pressure is negative at that level so that, in the ordinary way, no blood will flow, even if the needle happens to injure a vein.

(4) *Localization of spinal tumour* (*Myelography*).—The presence of a spinal tumour can be diagnosed by means of lumbar puncture with the aid of the *Queckenstedt test* which consists in noting the effect of compression of one or other external jugular vein on the pressure, or rate of flow, of fluid issuing from the lumbar needle. In a normal person, owing to the increased intracranial venous pressure brought about by the compression, there is a rise in both. In the presence of subarachnoid block, however, or when there is lateral sinus thrombosis on the same side, both the pressure and the rate of flow remain unaltered. This test, however, does not afford any information regarding the exact situation of the tumour. It is true that injection of light lipiodol through the lumbar needle may, on radiographic examination, show the lower level of the tumour by the level to which the oil has risen, but the light lipiodol does not show up well with X-rays. By means of the cisterna puncture, however, the upper level of the tumour can be seen clearly in a radiogram taken after injection of the heavy lipiodol. Moreover

if a successful radiogram is obtained after injection of the heavy and light lipiodols through the cisternal and lumbar needles respectively, the extent of the tumour can be ascertained. Further, a comparison of the pressure as well as of the composition of the fluids coming from the two needles, gives valuable information regarding the presence of a tumour—the pressure being higher and the globulin content being lower above the level of the tumour.

(5) *Ventriculography.*—Cisternal puncture may be used instead of ventricular puncture for the purpose of introducing air into the ventricles and obtaining a radiogram, in order to locate the exact situation of a supra-tentorial tumour. With the patient in the sitting position, a needle is introduced into the cistern, and if any fluid appears it is allowed to run until it stops—indicating that its pressure has become zero. A lumbar puncture is then done, when fluid begins to run from the lower needle and an equal volume of air enters at the same time into the cistern through the upper needle. 30 c.cm. of air are enough to render the ventricles visible in the radiogram.

(6) *Therapeutic purposes.*—(*a*) In cases of coma due to hypnotic drugs, such as those belonging to the barbituric acid group, Purves-Stewart and Willcox found that while lumbar puncture failed either to reduce the drug concentration of the fluid or to rouse the patient, cisterna puncture not only reduced the concentration of the drug in the cerebrospinal fluid but also restored the patient to consciousness, and brought about a cure. Similar treatment is indicated in cases of coma due to endogenous toxins, as in uræmia and eclampsia, although in a patient with eclampsia on whom I tried this treatment a few years ago, the muscular rigidity of the neck was so great that it was impossible to introduce the needle.

(*b*) In meningitis, when it is desired to introduce serum into the subarachnoid space of the brain, it is useless to introduce it by the lumbar route because experiment on the cadaver shows that 25–40 c.cm. of coloured fluid introduced by that route is barely sufficient to reach the level of the brain. The same amount of fluid, however (i.e. the amount equivalent to the usual dose of anti-streptococcal serum), introduced by the cisternal route, fills the ventricles and the convexity of the brain—unless the various foramina have been occluded by the inflammation. Several cures of cerebrospinal and pneumococcal meningitis have been recorded by this method of treatment (Ebaugh, 1925; Douthwaite, 1926; and others). I have seen considerable temporary improvement follow cisternal puncture and irrigation of the brain with normal saline in a case of streptococcal meningitis.

ANATOMY OF THE CISTERNA MAGNA

The cisterna magna has the shape of the heel of a lady's shoe, and has the following boundaries: above, the cerebellum and the postero-inferior cerebellar artery; in front, the pons and medulla; behind, the foramen magnum, the arachnoid, dura and occipito-atlantoid ligament, as well as the posterior arches of the atlas and axis; laterally, the lateral masses of the atlas and axis as well as the vertebral artery which lies on the atlas behind the superior articular process; below, it opens into the subarachnoid space of the spine at the level of the lower border of the axis. Its wide antero-posterior diameter, i.e. the distance between the occipito-atlantoid ligament and the bulb, is 1½–2 cm. (= about ½–¾ in.). The distance of the occipito-atlantoid ligament from the skin varies in different individuals according to their age, the degree of their muscular development, and the amount of subcutaneous fat. Its average distance is about 4½ cm. (i.e. just under 2 in.), in the adult male, but it may range between 3 and 7½ cm. In females it is about 4 cm., and in infants and children under the age of 10 years, it varies between 1½ and 4 cm., with an average distance of about 3 cm. (1¼ in.). Another important fact is that the straight line joining in the skull the tips of the mastoid processes, i.e. the bimastoid line, crosses the occipito-atlantoid at a distance of 2·5 cm. in front of the posterior border of the foramen magnum, or 2 cm. in front of the occipito-atlantoid ligament.

These relations and measurements are of the utmost importance.—As the longest antero-posterior measurement of the cistern is no more than 2 cm. or ¾ in., it is obvious that if the needle is pushed more than that distance into the cistern, after it has penetrated the occipito-atlantoid ligament, serious damage may be done to the medulla, with possibly fatal results. Also, the depth of the occipito-atlantoid ligament from the surface of the skin must determine the length of the needle to be used and the distance to which it may safely be pushed without causing damage. If aimed too high, the needle will strike the cerebellum, which in itself is no very serious matter, except that the lumen of the needle will be occluded, preventing the flow of fluid. Damage to the cerebellar artery, however, may be very serious, and in any case will give blood-stained fluid. Slight deviation (no more than 18°)

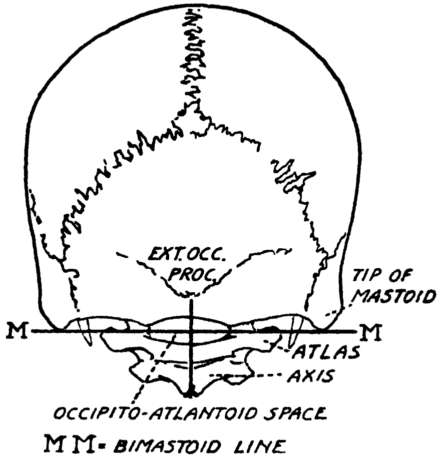


FIG. 1.—Showing the relation of the bimastoid line to the occipito-atlantoid space.

of the needle to one or other side of the sagittal plane may injure the vertebral artery. On the other hand, if the needle is not pushed far enough it will not reach the cistern at all.

TECHNIQUE OF CISTERNAL PUNCTURE

To perform the operation safely, a definite technique which takes account of the following points should be adopted: (1) External landmark, i.e. the point of entry of the needle; (2) the direction in the vertical and horizontal planes in which the needle is to be steered; (3) the distance which the needle may be safely allowed to go. The techniques extensively used throughout the world are those of Ayer and Eskuchen respectively. I shall describe each of these methods, and, after pointing out certain of the defects of each method, will describe the method of Castex and Ontaneda which seems to be scientifically perfect. It is assumed that whatever the method adopted rigid asepsis must be observed, and the patient's neck is to be shaved and painted with iodine.

Ayer's method.—The patient lies on his left side with his head fully flexed so as to open out the occipito-atlantoid space as much as possible. The operator feels for the spine of the axis, i.e. the highest palpable cervical spine and introduces the needle into the depression immediately above it. The needle is gently pushed forwards and upwards in the plane which passes through the glabella and the upper edge of each external auditory meatus, to a depth of 4–5 cm. (= about 2 in.) in the adult, and 3 cm. in young children. To ensure that the needle passes along the correct plane, which is difficult to see from the back of the patient, a pencil is inserted into the meatus and the needle is aimed in the direction of the upper border of the pencil. Further, to ensure that the needle is not pushed too far in, it is previously passed through a small thin piece of india-rubber, which can glide along it, and which is allowed to rest at the requisite distance from the point. When the needle has reached the occipito-atlantoid ligament, it is pushed on gently for another ½ cm., which corresponds to the thickness of the ligament and dura, when the cistern is reached and fluid begins to flow. Penetration of the ligament is accompanied by the same characteristic "feel" as when penetrating the ligament in lumbar puncture. As soon as fluid appears, the movement of the needle must stop in order to avoid injury to the medulla.

Eskuchen's method.—The point of entry of the needle is the point of bisection of the line joining the external occipital protuberance with the spine of the axis (erroneously called by Eskuchen the spine of the atlas), the patient lying in the left lateral position as in Ayer's method. The needle is directed forward, and somewhat higher than in Ayer's technique, so as to strike the occipital bone just behind the foramen magnum. It is then depressed slightly, by raising the butt, and gently pushed forward until it perforates the occipito-atlantoid ligament. This further distance should not exceed 1½ cm. (or ⅗in.).

In most cases either of these techniques is quite successful, and on the considerable number of cases in adults and children in whom I followed either of these techniques, no untoward results happened. It is obvious, however, that to a certain extent we have, with each of these methods to trust a good deal to luck. First, neither the spine of the axis nor the external occipital protuberance is always easily palpable. Secondly, the upward direction of the needle may, in Ayer's method, result in injury to the cerebellum, cerebellar artery, or pons, while in Eskuchen's method, which aims to avoid these accidents by aiming the needle towards the occipital bone, contact with the periosteum in the conscious patient is accompanied by a considerable amount of pain. But the most important drawback of both these methods is that although the *average* depth to which the needle has to be plunged

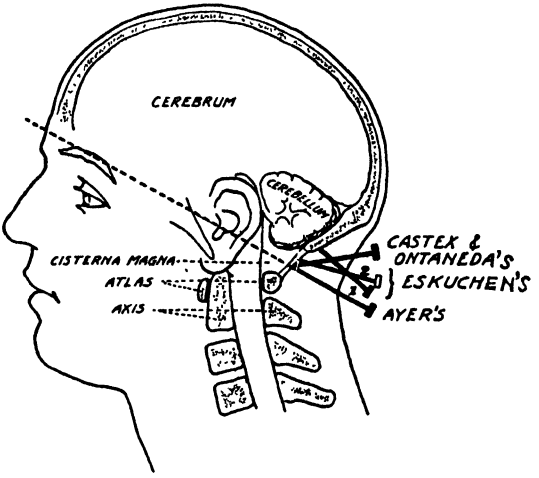


FIG. 2.—Anatomy of cisterna magna and the various methods of reaching it.

to reach the cistern is known, we do not know the *exact* depth in any particular case. Castex and Ontaneda's technique is designed to remedy these defects.

Castex and Ontaneda's method.—(1) External landmark: the needle is introduced at the point of bisection of the horizontal curved line joining the tips of the two mastoids. The horizontal plane in which this bimastoid line lies always crosses (as we have seen), the occipito-atlantoid ligament, 2½ cm. (= 1 in.) in front of the posterior border of the foramen magnum. Hence, not only will a needle, passed horizontally forward through the entry point, ultimately reach the cistern, but, by measuring the distance of the tip of one or other mastoid from a transverse line through the entry point, the exact depth of the occipito-atlantoid ligament, and hence also of the cistern, can be determined in each given case.

(2) The measurement of this " skin-mastoid " distance is easily effected by placing the edge of one limb of a folding foot-rule transversely over the entry point, while the other limb, fixed at right angles to the first, is placed antero-posteriorly under the lobule of the ear. The distance of one or other mastoid from the transverse limb may at once be read off on the forward limb of the foot-rule, and by subtracting 2½ cm. we obtain the depth of the occipito-atlantoid ligament in the given case. As the ligament and dura are together about ½ cm. thick, the actual distance to be subtracted for the depth of the cistern, is only 2 cm. (=⅘ in.). The distance so found is marked on the needle by means of a piece of india-rubber, as already described.

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ABDOMINAL EXAMINATION IN PREGNANCY

By A. E. CHISHOLM, M.B., F.R.C.S.E.
Assistant Obstetrician and Gynæcologist, Royal Infirmary, Dundee.

THIS may seem to be a simple and elementary subject to discuss, but it is of great importance to those practising midwifery, and it is of value at times to emphasize the usual and ordinary instead of concentrating on the exceptional. In general practice, the tendency is that the young practitioner will not have enough experience in the examination of the pregnant abdomen to become expert when difficult cases present themselves. For several years I have had the good fortune to have ample opportunity of examining such cases in large numbers, and I have naturally come to several conclusions as to methods and have worked out various ideas which may be worth handing on.

The question may be asked, is all the effort spent on antenatal care proving itself to be worth while? In some ways the results have not come up to expectations, for instance, with regard to sepsis. But, after all, sepsis tends to attack, as a rule, intra- rather than ante-natally, so a great improvement can hardly be expected from antenatal care alone. There is no doubt, however, that much has been achieved in cases of toxæmia, as also in cases of disparity when a timely induction may ease what would otherwise be a difficult labour.

Examinations must be made with system and thoroughness. Only practice in this manner will give the requisite deftness; but, in spite of extensive practice, those engaged in this type of work will frequently find themselves in doubt as to the exact state of affairs and every now and then will be altogether unable to form any idea of the true condition by ordinary methods. In cases of doubt, if there is no urgency, the patient may be seen later, e.g. in a month, when the difficulty may have cleared up. It may be necessary to have a radiogram taken, especially when a multiple pregnancy is suspected. A great deal may be made out by abdominal examination and many vaginal examinations may be eliminated. I am convinced that vaginal examination is performed needlessly in very many instances both before and during labour. Nevertheless, a doubtful vertex presentation, for example, may sometimes be confirmed or negatived by a vaginal examination. The methods of examination of the abdomen are (1) Measurement: (*a*) Pelvic, (*b*) Fundal. (2) Inspection. (3) Percussion. (4) Palpation. (5) Auscultation. (6) X-rays.

MEASUREMENT

(*a*) *Pelvic.*—I do not intend to go into the details of pelvimetry, as the subject is rather beyond the scope of this article. Suffice it to say that measurements should be looked upon only as indicative and not as absolute. With the same measurements, and with other conditions apparently similar, two patients may have very dissimilar experiences in their labours. A very low pelvic measurement will certainly act as a danger signal, but the true test is the relation of the fœtal head to the brim of the pelvis, and this can usually be fairly accurately gauged by abdominal examination. Internal measurements are, in my experience, seldom required because the relativity can be judged in very many cases without their aid. Even if the diagonal conjugate is taken, it must be regarded, as in the case of the external measurements, as of approximate, and not of absolute, value. Much depends on three incalculable factors: (1) The mouldability of the fœtal head; (2) The mobility and relaxation of the maternal joints—the sacro-iliac joint and symphysis pubis; (3) The strength of the uterine contractions.

(*b*) *Fundal.*—This will be dealt with under " Palpation."

INSPECTION

The size and shape of the abdominal swelling will be noted. If the abdomen is unduly large and stretched, with a smooth surface, a rapidly increasing hydramnios may be suspected. The striæ are of little account but they are interesting in that they are nearly always fairly regularly bilateral in distribution. They are not necessarily present over the most stretched parts. In fact, they may appear only on parts which do not show any stretching. A thick swollen appearance just above the pubes may draw attention to œdema. This is sometimes first noted, however, on auscultation by the rim of the stethoscope leaving a depressed ring on the surface. If the bladder is distended it will show as a swelling above the pubes. At the upper part of this prominence there will be a shallow transverse sulcus and beyond this the curve of the uterus will extend upwards. An obvious bladder swelling need not mean that the organ is over-distended, for the bladder is largely an abdominal organ in later pregnancy and its normal distension may be coincident with quite a definite forward bulging. It is well, when deformity is suspected, to examine the spine, thorax, and lower limbs.

PERCUSSION

This is sometimes of use in deciding the upper limit of the fundus in doubtful cases. If ascites is suspected percussion may be helpful, as also in cases of toxæmia in which there may be diminished liver dulness pointing to the possibility of acute yellow atrophy of the liver.

PALPATION

This method of examination is very important and must be carried out carefully and exactly. To find the fundus, it will usually suffice to feel with the flat of the hand. If this method does not give definiteness, a good plan is to fix the fundal region with one hand and press upwards from below with the other, thus gently forcing the uterus slightly upwards and pressing the fundus against the upper hand. In this way the upper border of the fundus can usually be delineated. Percussion may be helpful in this part of the examination.

To calculate the stage of pregnancy from the vertical height of the fundus, the level of the fundus is measured from the upper border of the symphysis pubis to the fundus uteri; this fairly accurately includes the whole of the corpus uteri during later pregnancy. The calculation is based on the estimate of the pregnancy lasting for ten lunar months of four weeks each, or forty weeks; it is also based on an average growth per lunar month of 3½ cm. Thus, to find the gestation period, in lunar months the vertical height of the fundus (in centimetres) must be divided by the average monthly growth, namely, 3½ cm. In other words, it must be multiplied by 2 and divided by 7. Half the remainder will give the number of weeks. Thus, if the fundus measures 23 cm.: $\frac{23 \times 2}{7} = \frac{46}{7} = 6\frac{4}{7} = 6$ lunar months and two weeks. This subtracted from 10 leaves three lunar months and two weeks or fourteen weeks till term. This seems very simple and definite, but there are many fallacies which tend to throw the estimate out of gear.

Fallacies.—(1) In cases of vesicular mole the uterus tends to be considerably larger than it should be as judged by the period of gestation estimated from the last menstrual period. (2) Hydramnios. (3) An unduly large child. (4) An unduly small child. (5) Multiparity. (6) An abnormal child, e.g. hydrocephalus. (7) Tumours. (8) Ascites. (9) Abdominal fat. (10) Pendulous abdomen—more apparently than truly a fallacy. (11) Irregular upward growth of the fundus: It is frequently found that from month to month the upward growth of the uterus is by no means regular. Sometimes it may rise little, if at all, in a given time. This does not mean that the child is not growing steadily, but it is probably due to a degree of laxity with a general widening of the uterus rather than a normal upward growth. It may possibly be due in some cases to a changing ratio between the size of the fœtus and the amount of liquor amnii. At times the upward growth may be more rapid than the average. When measurements and menstrual history correspond satisfactorily an estimate can be made with a fair degree of confidence.

How to place the hands.—Standing on one or other side of the patient place the flats of the warm hands gently and firmly on the abdomen with the fingers pointing towards the pelvis. Prodding and sudden movements must be avoided as they are apt to cause the patient to make a defensive contraction of her muscles, thus interfering with the examination. Encourage confidence in the patient with a view to obtaining good relaxation.

What to feel for.—The head is the most important fœtal part to locate. Therefore search for it first. In the vast majority of cases it presents at the brim. The proper procedure therefore is to palpate for the head where one expects to find it, namely, at the brim. If the head is found to be presenting, the fundus can safely be left alone, except for measuring its vertical height, unless multiparity is suspected. Thus time will be saved, especially when large numbers have to be examined at an ante-natal clinic. If the fundus is palpated first and a head suspected of being in it, one must still confirm the absence of a vertex presentation, because the head in the fundus is more difficult to be sure of than the head presenting. It often feels smaller at the fundus than at the brim and it may be quite easily mistaken for a breech. This difficulty is due to the fact that the head in the fundus is difficult to fix, being less under control and more elusive.

Sometimes the head is not felt by ordinary methods either at the brim or in the fundus or in one or other iliac regions. In such a case the following procedure is often conclusive, avoiding the need for vaginal or X-ray examination. Standing as already described, with the flats of the hands on the abdomen and the fingers pointing towards the pelvis, press the fingers backwards and downwards and ask the patient to expire gently at the same time. As she does so, dip the fingers towards the pelvis, keeping up this pressure while the patient next inspires. Repeat this once or twice, dipping more deeply each time. As a rule, by the third or fourth expiration the fingers will touch the head well down in the pelvis. This is a most helpful, as well as a very simple, manipulation. If, however, doubt still exists and if time is pressing for a definite diagnosis, a vaginal examination may clear up the difficulty. Failing a satisfactory conclusion even then, an X-ray film should be obtained.

When the vertex presents the questions to be asked are: (1) Is the head fixed or mobile? (2) Will the head go through the brim with reasonable ease?

How to test for disparity.—Fancy grips and methods are not required. It must be remembered that the relativity must be related to the stage of pregnancy at the time of examination. At the eighth month it may seem likely that a head may go through, but a month later it may cause great difficulty. Therefore, repeated examinations must be made towards full time so as to anticipate and obviate trouble as far as possible. The three incalculable factors already referred to—mouldability of the fœtal skull, mobility of the maternal pelvic joints, and the strength of the uterine contractions—must not be forgotten in making the estimates. A very simple and effective method for judging the relativity of the head to the brim is the following. Standing on the patient's right side, fix the head with the left hand, pressing it downwards and backwards toward the pelvic cavity. Place the fingers of the right hand on the front of the symphysis pubis and press upwards on to the head. Thus, any overlap, and the amount of it, may be made out with a fair degree of accuracy. Sometimes a better idea may be obtained if an assistant also presses the fœtus downwards from the fundus. This will help to flex the head and give a truer estimate of the state of affairs. It is wise to take into account what happened in previous labours, but obviously one must know the weights of the babies in order to get any real help from the facts elicited. It is rare that one can discriminate by palpation between occiput and sinciput. An attempt must now be made to palpate the fœtal back. Sometimes this is very easy and at other times only an impression of greater resistance at one side than the other may indicate where the back lies. Not infrequently no back can be felt at all; this is especially so in cases of occipito-posterior position. Sometimes two oblique soft ridges can be felt running downwards on either side of the uterus; these are the round ligaments. Subjectively, one may elicit tenderness, particularly in the iliac and kidney regions and more especially on the right side. This may signify pyelitis. In such a case a catheter specimen of urine should be examined for the presence of pus.

AUSCULTATION

The best stethoscope to use is that of the Pinard type, which has a wide sound-collecting area. The fœtal heart sounds can usually be heard quite satisfactorily, but not always. Inaudibility of these sounds does not necessarily mean that the fœtus is distressed or dead. Much depends on the position in which it is lying and on the thickness of the maternal abdominal wall. Also such a condition of hydramnios may mask the sounds. The fœtal heart sounds are best heard through the fœtal back, unless in the case of certain grossly abnormal positions, because the fœtal back fits in with the curve of the uterine wall and thus is nearer to the ear than the anterior aspect of the fœtus, the fœtal limbs intervening between the uterine wall and the front of the fœtal body. One will often confirm the position of the fœtal back by auscultation when in doubt about its position on palpation.

PRESENTATIONS

In cases of L.O.A. and R.O.A. the maximum fœtal heart sounds are heard to left or right of the mid-line, as the case may be, and well below the umbilicus, the level varying as to whether the head is in the pelvis or not. Frequently the back may be found to lie laterally and the head in the transverse diameter of the inlet. In these circumstances the progress of the labour will be, most frequently, that the occuput will go forward. Rotation is frequent. Thus a case of L.O.A. may, within a few days, become one of R.O.A. and later may change back to its original position. In some cases the back cannot be felt at all and the heart is best heard far round in the right flank, but not very distinctly as a rule. This raises the suspicion of a posterior position. In these cases the heart may sometimes be heard also to the left side anteriorly, but very faintly. This may be due to some undoing of complete flexion on the part of the fœtus thus allowing the front of the chest to travel forward a little distance and bringing the fœtal heart by that amount nearer to the stethoscope. As already indicated, the fœtal limbs tend to be felt very much to the front in cases of posterior position. L.O.P. is sometimes diagnosed in the antenatal clinic, but it is rare. In passing one would lay stress on the value of Buist's pads, when a posterior position is present, applied in a proper and timely manner.

Breech presentations.—In these cases no head can be felt presenting and a mobile body will usually be made out in the fundus, ballottement being elicited because of the liquor amnii and also because of the flexible neck of the child. The back must then be located. The next point is of importance because the true state of affairs is so often mis-stated. It is taught that in full-time breech presentations the maximum fœtal heart sounds are heard above the umbilicus. This is quite wrong. The maximum may be at the umbilical level, but it is more frequently a little lower down. On very rare occasions it may be just above the umbilicus. If the fœtus is mapped out by surface markings it will be found that the expected place for the heart sounds to be heard best is a little below the umbilical level, because the fœtal heart itself is at this level. Thus the level of the maximum fœtal heart sounds is not of much value in making a differential diagnosis between vertex and breeech presentations. The level will be just a little higher in the case of L.S.A. than in that of L.O.A., for example. But variation will occur depending on whether the presenting part is in the pelvis or only at the brim. In cases of breech presentation, especially in primiparæ, external version should be carried out if possible, with or without an anæsthetic, according to circumstances. This will be more difficult if the legs are extended, a state only to be made out, in the pre-labour stage, by means of X-rays. After an easy version there may be a tendency for a recurrence to breech presentation to take place. This may be prevented by applying a binder with lateral pads. Spontaneous version from breech to vertex presentation in late pregnancy probably occurs more frequently than is usually thought, but it cannot be depended on to occur in any given case.

MEDICO-LEGAL PROBLEMS IN GENERAL PRACTICE*

X.—THE JUDICIAL FUNCTIONS OF THE GENERAL MEDICAL COUNCIL

By Col. NORMAN C. KING, T.D.
Late Registrar, General Medical Council.

THE power of the General Medical Council to remove the names of medical practitioners from the Register for misconduct is given by section 29 of the Medical Act, 1858, which runs as follows :—

> If any registered medical practitioner shall be convicted in England or Ireland of any Felony or Misdemeanour, or in Scotland of any Crime or Offence, or shall after due inquiry be judged by the General Council to have been guilty of infamous conduct in any professional respect, the General Council may, if they see fit, direct the Registrar to erase the name of such medical practitioner from the Register.

It will be seen that the inquiries take place under two heads, namely, that relating to convictions and that relating to "infamous conduct in a professional respect." It should be noted that the Council cannot deal with convictions outside the United Kingdom; consequently, in cases of this kind the Council can take no action unless it is possible to charge the practitioner with "infamous conduct."

To deal with all cases coming under this section the Council has set up a special Committee of five which, assisted by a barrister of standing who acts as Legal Assessor, and the Council's Solicitor, acts the part of a Grand Jury. This Committee does not in any sense try the case, but decides whether there is *prima facie* evidence calling for a formal inquiry by the Council, or whether the circumstances suggest that a letter of warning may suitably be sent, or whether, in the absence of relevant evidence, no further action is necessary.

With regard to convictions, the Home Office in

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* This is the tenth of a series of articles on medico-legal subjects.

England and the corresponding authorities in Scotland and Ireland have intimated to the police all over the kingdom that reports of convictions of medical practitioners for any offence whatsoever should be sent to the Council. Some of these are trivial, such, for instance, as having the number-plate of a motor-car unlighted, or omitting to pay a dog licence. In these cases the Council, as a rule, takes no action beyond recording the fact of the conviction. Other cases may be those of convictions for drunkenness, and, unless this conviction is for an offence committed when in attendance on a patient or (say) when in charge of a motor-car, it is usual to issue a warning to the convicted practitioner. But should further convictions of the same sort be reported, the Committee may think that they indicate a habit of intemperance which might be dangerous to the practitioner as a professional man and to the patients under his charge; in this case it might be decided that, for the protection of the public, the practitioner should be summoned to appear before the Council. There are other convictions of a still more serious nature, such as those of felony, in which, obviously, the Council ought forthwith to consider the matter in relation to the practitioner's professional status, and to the good repute of the Register.

The Council does not go behind the evidence given at the trial or allow the justice of the conviction to be questioned, although the circumstances and character of the offence are considered in determining whether the conduct of the practitioner has been such as to justify the Council in inflicting the severe penalty of removing his name from the Register.

If an allegation of "infamous conduct" is received, the Standing Orders prescribe that the complaint must be formulated in writing, stating the grounds of complaint, and accompanied by one or more Statutory Declarations as to the facts alleged. The practitioner, if the complaint is relevant to his profession, is then asked to give such explanation of the matter in writing as he may think fit, and the complaint and the answer thereto are brought before the Committee. If, in their opinion, a *primâ facie* case has been made out, which justifies an inquiry by the Council, the practitioner is in due course summoned to appear. In cases in which a practitioner has been under the censure of a judicial or other competent authority in relation to his professional character as the result, for instance, of an inquiry into professional conduct held under the National Health Insurance Acts or of a trial in the Civil Courts, Statutory Declarations by the authority in question are not required; but the depositions, judgments, and other relevant documents are officially supplied, and in other respects the same procedure is followed by the Council.

If it is decided that an inquiry is to be held, the accused practitioner receives from the Council's Solicitor a formal notice of the charge accompanied by a summons to attend before the Council. He is supplied on application with a copy of all documentary evidence against him, and full opportunity is given to him to answer the charge and to support his case by Statutory Declarations, or by oral statements by himself and/or by witnesses at the hearing.

The complainant and the accused practitioner may appear by solicitor or counsel, or in person. The accused practitioner is expected to be present in person and has the option of whether he will or will not submit himself for examination; if he does so, he is liable to cross-examination, and also to be questioned by the President or by members of the Council through the President. The Council has no power to subpœna witnesses or to administer the oath.

In the case of complaints by private persons or non-official bodies it is usual to require them to present their case, but in cases of conviction, and in certain other cases in which it seems highly desirable that in the interests of the public an inquiry should be held, the Council's Solicitor may be instructed to lay the facts before the Council. The hearing is in public, and witnesses are called, examined, and cross-examined as in the ordinary Courts of Law; questions may also be put to witnesses by members through the Chair.

The Legal Assessor is always present to assist the Council in regard to any points of law or procedure which may arise, and if asked by the President, he sums up, and indicates the legal weight to be attached to each part of the evidence in the same way as a judge sums up for a jury. From time to time cases occur in which it is not desirable that the hearing should be in public, and in such cases, if both parties concur, the hearing may take place *in camera.*

At the conclusion of the hearing, the public and the parties, including the Council's Solicitor if he has been called on to lay the actual facts before it, withdraw, and the Council then deliberates upon the case *in camera.* It decides first, whether sufficient evidence has been produced to enable it to come to a decision on the facts alleged; secondly, whether the conviction, or facts alleged in the charge, have been proved to its satisfaction; thirdly, whether it will proceed to judgment at once, or postpone this to a future date; and fourthly, if it does not postpone judgment, whether, on the facts proved, the name of the practitioner is to be erased on the ground that he has been convicted of a grave offence, or is guilty of " infamous conduct in any professional respect." A full shorthand note of the whole proceedings is taken, and copies are accessible if they are required either by the Council itself or by any competent authority.

The words " infamous conduct " have been defined in a judgment given by Lord Justice Lopes in the case Allinson *v.* The General Medical Council in the following words : " If a medical man in the pursuit of his profession has done something with regard to it which will be reasonably regarded as disgraceful or dishonourable by his professional brethren of good repute and competency, then it is open to the General Medical Council, if that be shown, to say that he has been guilty of infamous conduct in a professional respect." As a result of this judgment there is no appeal to the High Court against a decision of the Council unless it can be shown that there is some flaw in the judicial procedure or something of the kind. The Council is the final judge of what constitutes "infamous conduct."

The Act gives the Council no explicit power of suspension, nor, in view of the fact that practice by an unregistered person is not prohibited, would mere suspension from the Register be of any practical value to him. A practitioner's name is either on or off the Register. If it is on the Register, he is entitled to all the privileges of registered persons, and these could not be suspended in the case of an individual without the actual erasure of his name. He must have all or none. A person who possesses a recognized qualification in medicine, surgery and midwifery is qualified, but he is not "legally qualified" unless his name appears on the Medical Register.

The practice of suspending judgment to a later date is one which has been gradually evolved by the Council. The Act gives one penalty only—namely, that of erasure, but there are cases in which, when a practitioner has, for instance, been repeatedly convicted of drunkenness and promises amendment, the Council suspends judgment in order that he may have time to show that his word is good, and in this event the practitioner is summoned to appear in six or twelve months' time and to produce evidence as to his good conduct in the interval. At the adjourned hearing, if the evidence of conduct is satisfactory, the Council, although it may have found the conviction or the facts, as the case may be, to have been proved, does not deem it necessary to proceed to judgment or to the direct the erasure of the name from the Register, and accused practitioner is "discharged with a caution."

The convictions which have been considered include those for procuring abortion, bigamy, conspiracy (defeat of the Military Service Act, 1916), indecent assault, drunkenness, obtaining money under false pretences, exposing the person, breaches of the Dangerous Drugs Act, and the like. Cases of infamous conduct have included advertising or canvassing for the purpose of obtaining patients, abuse of professional position, "covering," i.e. enabling an unqualified person to practise under his ægis, the issue of false, misleading or improper certificates.

A practitioner whose name has been erased may, later, under the conditions set forth in the Standing Orders, apply to have it restored; and if, in the opinion of the Council, it will not be prejudicial to the public interest to grant his request, his name is thereupon replaced upon the Register. It may here be remarked parenthetically that the Council has no jurisdiction over the Licensing Bodies in regard to the withdrawal, under their by-laws, of their qualifications from one of their own members or licentiates. Certain bodies, for instance, many of the universities, have no statutory power to withdraw their degrees once they have been conferred. Others, such as the Royal Colleges of Physicians and Surgeons, have power, independently of any action by the Council, under their own by-laws, to suspend or expel their members for offences involving a breach of their particular regulations or of the practitioner's declaration on admission. When a practitioner applies for restoration it is essential, in order to conform to the law, that he should actually be in possession of at least one qualification; for restoration is in effect re-registration. If he is not, the Council has no power to restore his name only, for he is in fact unqualified. He must, therefore, first apply to the bodies whose qualifications he formerly held, asking to have his qualifications restored. In this matter the Licensing Bodies have necessarily complete autonomy. They are not bound either to await or to follow a decision by the Council.

It is the custom of the Council from time to time to issue " warning notices " to practitioners in regard to points of professional conduct, and it has been the practice not to issue such a warning until a number of cases of a particular form of misconduct have been brought before the Council, indicating that a state of things is becoming prevalent which is contrary to the public interest.

For instance, in certain parts of the country it was formerly customary for a qualified man in general practice to employ one or more unqualified persons as his assistants. Sometimes these were partially trained students who, either because they had failed in their examinations or for want of means, had not obtained a qualification; in others they were laymen who had acquired a certain amount of rule-of-thumb experience. Sometimes a practitioner did not see a patient until it was time to sign a death certificate in order to avoid an inquest.

After hearing a number of cases of this kind and accumulating a sufficient body of experience regarding the mischief which had to be remedied, the Council issued a " warning notice " respecting the professional offence of " covering." The offence in this aspect has practically disappeared, but from time to time cases of " covering " of uncertified women to enable them to practise as midwives, and of association with unqualified persons, still occur. It should be remembered that the object of the Medical Act, 1858, was to enable persons to distinguish between properly qualified and unqualified persons; consequently, if there was association between the two, the object of the Act might be defeated.

Again, the practice of advertising, whether directly or indirectly, for the purpose of obtaining patients or for promoting a practitioner's professional advantage was brought to the notice of the Council. If this were persisted in unchecked, the practitioner who had fewest scruples in praising himself and his wares would reach the widest public and extend his practice without any guarantee that his merits were in fact superior to those of other practitioners. It was discreditable to his profession and contrary to the public interest that a professional man should thus adopt the methods of the unqualified self-praising and self-advertising practitioner of medicine and surgery, and a warning was therefore issued in regard to this matter. It may be added, that the publication in the lay press of articles on medical subjects by medical practitioners has not been condemned by the Council unless it has been proved that the articles come under the terms of the warning notice, or are otherwise of an objectionable character.

To sum up, it is clear first that the object of the Council is the protection of the public; secondly, that it does not itself initiate proceedings nor employ detective methods, nor act as prosecutor against registered practitioners. It is a Statutory Court of Justice and takes action only in cases of criminal offences, or of judicial censure officially brought to its notice, or in cases of formal complaints supported by *primâ facie* evidence brought before it by responsible persons or bodies. Thirdly, its judicial procedure is based as nearly as may be on that obtaining in the Law Courts. It first performs the function of a jury and then that of a judge. When a charge is made, the practitioner has every possible opportunity of defending himself and, should his name be erased from the Register, it may after a lapse of time be restored thereto if that can be done with safety to the public.

PRACTICAL NOTES

GARGLES AND THROAT IRRIGATIONS

The value of gargles remains an undecided matter in the minds of practitioners who have given the subject their attention. For this reason and because of the extensive exploitation of gargles by advertisers to the lay public, W. Snow and J. E. Stern (*Journal of the American Medical Association*, September 15, 1934, ciii, 831) undertook objective studies of the comparative value of gargles and throat irrigations. For these observations, patients used a thin liquid suspension of barium sulphate while lateral X-ray views of the head and neck were made. The first methods included (1) violent gargling, (2) gentle gargling, and (3) tilting the head backwards and allowing the suspension to run as far backwards as possible without gargling. A study of the films showed that with all these methods the tongue is firmly pressed against the soft palate in such a position that the liquid cannot reach the anterior faucial pillars. Occasionally if the subject interrupted the procedure to take a breath of air, a small stream of the mixture leaked backward and then had to be swallowed. Further observations were made in which gravity irrigations were used with the head and neck flexed. The fluid ran from a container placed 18 inches above the mouth through a length of rubber tubing and a narrow irrigating tip. Study of the films showed that the hypopharynx, oropharynx and nasopharynx were thoroughly irrigated; in fact, frequently some of the fluid ran out of the nose. With this method the swallowing reflex was not evoked. These observations led the authors to believe that gargling is ineffective and should be replaced by the gravity irrigation method. This method has, of course, been used by a number of practitioners for many years.

THE TREATMENT OF ACUTE RHEUMATISM BY STREPTOCOCCUS ANTITOXIN

Since their introduction by Maclagan, in 1876, for the treatment of acute rheumatism, salicylates have received an extensive, if not a universal, adoption in the treatment of this condition. In spite of this extensive use, however, over a period of practically sixty years, there is still a considerable divergence of opinion as to their real value. John Eason and W. A. R. Thomson present a study (*Edinburgh Medical Journal*, October, 1934, xli, 590) based upon a small series of twelve cases of acute rheumatism which were treated by means of streptococcus antitoxin. The ages of the patients ranged from 10 to 36 years, the average age being 21.75 years. In the series were 11 females and 1 male. There were two cases of chorea. With the exception of one case, the antitoxin was given within two or three days of admission to hospital. The antitoxin used was concentrated streptococcus antitoxin (scarlatina), the dosage varying from 30 to 90 c.cm., given in two or three instalments—in 11 cases being administered intramuscularly, while in the other the intravenous route was used. As a control group, 27 consecutive cases were used who had received treatment by means of salicylates. The ages of these patients ranged from 55 to 15, the average being 29.2 years. There were 18 females and 9 males. A study of the clinical records of the cases showed that, in the series treated by antitoxin, the results could be considered "good" in 9 cases and "moderate" in 3; while in the series treated by salicylates the results were "good" in 14 cases and "moderate" in 3; 10 being classified as failures because they failed to show any improvement after prolonged treatment. These results are of interest, not only from the therapeutic aspect, but also from the etiological point of view. In every case there was a distinct improvement after the appearance of the rash, an improvement which in most cases was maintained. It is of interest that both the cases of chorea included in the series made a satisfactory recovery. The results of treatment by streptococcus antitoxin so far are therefore encouraging and compare favourably with those obtained by means of salicylates. Indeed, it was the complete absence of any sign of improvement after a month's intensive treatment by salicylates in the first case in the series that suggested the use of streptococcus antitoxin, and within a few days of the administration of the antitoxin there was a marked alleviation of the symptoms, the patient thereafter making a complete and uninterrupted recovery. One warning, however, is essential—it is a form of treatment which for the present should not be employed except in hospitals and nursing homes under strict medical supervision.

THE TREATMENT OF PERNICIOUS ANÆMIA

Under the auspices of the Ministry of Health a useful review of recent researches on the nature and therapy of pernicious anæmia, by E. W. Adams, has just been published (*Report No. 75, Ministry of Health.* H.M. Stationery Office, 1934). The materials at the disposal of the clinician are now very varied and may be conveniently grouped under the headings of (A) animal preparations, and (B) non-animal preparations; under the former category come (1) raw materials—whole liver, kidney and gastric tissue, and (2) extracts—liver extracts (solid and liquid), gastric extracts, liver-gastric preparations, concentrated swine juice, as well as some other products which have as yet scarcely emerged from the laboratory stage; under the heading of non-animal preparations come Marmite (a yeast preparation) and some others of more doubtful value, such as massive doses of iron, in combination with liver. Liver itself is still used in the treatment of pernicious anæmia and has some advantages over the more sophisticated preparations. The chief advantage of liver extracts lies in the score of convenience; patients can take them more easily. The disadvantages of the liver extracts are (1) expense, and (2) the danger of inefficacy. The more reliable firms have, however, each batch clinically tested, so that the question of efficacy should not arise for the judicious clinician. On balance, the advantages of liver extracts much outweigh the disadvantages. Of late the popularity of the liver extracts has been rivalled by preparations derived from the stomach tissue of the hog, and some clinicians are convinced that they are greatly superior to liver and liver derivatives. Besides its efficacy, this method is usually much cheaper than any other form of treatment.

ACUTE RAPIDLY-SPREADING INFECTIONS FOLLOWING TRIVIAL INJURIES TO THE HAND

No type of infection can develop more rapidly or become a menace to life with more dramatic and deadly haste than that type of infection variously termed acute lymphangitis, acute spreading cellulitis, acute streptococcic septicæmia, and, by the laity, blood poisoning. It usually follows a trivial injury of a finger or hand, an infection of the lip or face which has begun as an apparently innocent furuncle, or the extraction of an infected tooth. The acute spreading infections which have followed an injury of the upper extremity are most common. S. L. Koch reports (*Surgery, Gynecology and Obstetrics*, September, 1934, lix, 277) 32 cases of acute spreading infection, all of which developed rather rapidly after trivial injuries, and in the majority of which the outstanding symptom early in the course of the infection was the presence of red lines of extension along the lymphatic channels leading upward to the axilla. In two of these cases the inflammatory process subsided rather promptly and without localization and abscess formation. In five cases the symptoms at the original site of injury disappeared rather rapidly, but marked axillary lymphadenitis developed and subsequently abscess formation. In 15 cases the inflammatory process extended upward rapidly at first, then more slowly and finally came to a halt, usually at a level between the elbow and the shoulder. After a varying interval the process began to recede, and eventually abscess formation took place. Nine patients, amongst whom were two medical practitioners and two nurses, died after intervals of from four to 13 days after the original injury. One patient succumbed to a bilateral bronchopneumonia 35 days after the injury. Of the 22 patients who recovered, all were treated conservatively from the moment they were first seen, with rest in bed, massive warm wet sterile dressings over the entire upper extremity and forced administration of fluids; and in none was the inflammatory process incised until absolute evidence of localization and abscess formation was present.

THE TREATMENT OF CARBUNCLE

The following prescription is recommended for the treatment of carbuncle in an article (*Journal of the American Medical Association*, October 6, 1934, ciii, 1066) dealing with the therapy of the Cook County Hospital, Chicago, edited by Dr. Bernard Fantus :—

MAGNESIUM SULPHATE-PHENOL PASTE

℞	Dried magnesium sulphate - -	75.00 grams (℥ii)
	Liquefied phenol - - - -	10.00 c.cm. (ʒii)
	Glycerin - - - - -	90.00 c.cm. (℥iii)

Mix in a hot mortar, with a hot pestle, and keep in a tightly covered jar to prevent absorption of moisture.

Label : Apply on lint to cover the whole of the affected area, and cover with a thick pad of absorbent cotton.

CORRESPONDENCE

INFRA-RED RAY-THERAPY AND THE TREATMENT OF PAIN IN LUMBAGO AND SCIATICA

SIR,

The statement of Dr. F. G. Thomson in his article on " The treatment of pain in lumbago and sciatica " published in the September issue of *The Practitioner* (1934, cxxxiii, 274) that " It is very doubtful if the infra-red rays are more effective in relieving pain than radiant heat " impels me to write you, because in my experience the benefits to be derived from the application of infra-red rays in many widely dissimilar clinical conditions have been notably consistent and in many instances even spectacular. That experience now comprises well over two thousand treatments all personally administered to some two hundred and fifty cases during the last four years, after five years previous experience of ultra-violet rays. Cases have been accepted for treatment irrespective of age or duration of illness and not infrequently as a last resort after many other forms of therapy have been tried; all such cases are included in these statistics. In approximately 80 per cent. of the cases infra-red rays alone have been used. In some 12 per cent. ultra-violet rays have been used in conjunction, and in some 7 per cent. a certain amount of massage. The lamps used embody a central wire-wound core set in a circular reflector. The method is safe, simple, comforting and effective; it provides sufficient heating, both superficially and deeply, and produces a perfect erythema; its outstanding effects are the rapid relief of pain, and the removal of congestion and stasis, conditions in the tissues which are surely the basis of so many ailments. Clinically my cases have consisted of: Arthritis—osteo-, rheumatoid, and traumatic; fibrositis, acute and chronic, including lumbago and " backache "; neuritis, sciatica, tic douloureux, herpes and post-herpetic neuralgia, toothache, headache; muscular rheumatism, post-influenzal pains; facial paralysis, nerve and muscle weakness; paralysis agitans; deafness, tinnitus, otitis media, earache; Raynaud's disease, chilblains and " bad circulation," œdema of legs; onychia, boils, ulcers, carbuncle induration; coryza, catarrh, aphonia, chill, asthma; injuries—strained back, knee, ankle, foot, toe, shoulder, " tennis elbow," falls on back, coccydinia. A critical analysis of the results shows that 14 per cent. have obtained complete relief or cure in from one to three treatments, 33 per cent. in from four to six treatments, and a further 33 per cent. have been entirely satisfactory but after longer periods. This totals 80 per cent. of perfectly good results, and included in the residual 20 per cent. classified as inconclusive or unsatisfactory are various serious conditions in which improvement could perhaps hardly be looked for.

Yours faithfully,
CYRIL E. MICHAEL, M.A., M.B., B.C.

HÆMANGIOMA OF THE TONGUE

SIR,

The following words appeared in Mr. Stanford Cade's excellent article dealing with non-malignant diseases of the tongue (*The Practitioner*, 1934, cxxxii, 645):—" Nævous angiomas can be either excised or treated by diathermy; CO_2 snow is not applicable; injection of sodium urethane, salicylate or sodium morrhuate on the lines used for varicose veins could on theoretical grounds be tried, but no reports of this treatment are available." Before reading this I had, with some trepidation, injected a half c.cm. of quinine and urethane solution into a nævous angioma of the tongue, with apparent cure.

A lady, aged 66, came to see me in June of this year about a lump on her tongue, which she said was painful and increasing in size. She was much worried and sleeping poorly because she feared that it was growing into a cancer, and some relative had died of cancer of the tongue. There was a compressible non-pulsating tumour with the size and appearance of a large ripe mulberry on the side of the tongue at the junction of middle and posterior thirds. An artificial denture was causing some irritation. A few minims of novutox local anæsthetic were injected anterior to and deep to the angioma. The syringe was then charged with half a c.cm. of quinine urethane solution and the needle passed into the angioma itself and discharged. An astringent mouth-wash was ordered. There was an increase of pain and swelling during several weeks. I had only the opportunity of examining the tongue after one week, and then after two months, from the time of injection. On the first occasion there was certainly obvious increase in size; on the second, all appearance of angioma, swelling of any sort, discomfort, and, last but not least, anxiety, had entirely disappeared. The lady was sleeping well and had gained weight considerably.

No doubt details of technique would be modified to suit particular cases, and it seems that it is wise to give an astringent mouth-wash for use after any food, to give warning that there may at first be some increase in size, and to give some analgesic such as aspirin and pulv. ipecac. co. to be taken if required at night.

Bourne, Lincs. W. B. R. MONTEITH, F.R.C.S.E.

THE TREATMENT OF PUERPERAL SEPTICÆMIA

SIR,

The methods of treatment suggested for puerperal septicæmia are many and varied. I suggest that the publication of different lines of treatment successful and unsuccessful, would have a high practical value in deciding the best method in this very serious problem. Treatment on conservative lines resolves itself into: (1) Local disinfection and irrigation of the vagina and the uterine cavity. (2) Giving of drugs and antiseptics by mouth or intravenously. (3) Expectant treatment. I append the following notes of a case of puerperal septicæmia.

The patient developed the condition on the fourth day following her confinement. On admission to hospital the patient looked very toxic. She had a small vaginal tear holding one stitch which I removed. The edges of the wound were unhealthy looking and there was a fair discharge of pus from the vagina. Her practitioner assured me that the placenta was completely delivered. I did not consider manual exploration of the uterus advisable. I gave her 22 c.cm. anti-scarlatinal serum on admission, at 9.30 p.m. On the following morning I gave her an intra-uterine iodine douche, strength ʒii to a quart of sterile water, followed by intra-uterine injection of ʒii glycerine. This treatment was repeated daily. I was primarily concerned with the pulse-rate, which dropped from 128 to 108 on the third day. On the fourth day the pulse-rate began to accelerate, a feature I did not like. I continued the douche and glycerine which, despite the increase pulse-rate, seemed to benefit and ease the patient greatly. In addition I gave 10 c.cm. collosol iodine intravenously. This was followed by an immediate depression of the temperature curve, and the pulse-rate after a momentary acceleration steadily declined. A maintained pulse-rate of 121–130 has a 40 per cent. mortality, so the fall was a relief with regard to prognosis. I repeated the douche, glycerine and collosol iodine the following two mornings with very beneficial results. From the seventh day onwards the pulse-rate remained between 86–90 and temperature 99–98° F. Throughout the illness I insisted as far as possible on abundant liquids, and what I consider important, a variety of them. My chief stand-by was milk; she also had glucose and lemon drink, tea, coffee, beef-tea, egg and a little brandy. Even when very ill I got her to consume up to three pints of milk in the day. Sleeplessness was well controlled by medinal gr. vii ss. There was much abdominal and pelvic pain for the first three days relieved by aspirin gr. x.

Yours faithfully,

Tralee. M. F. McELLIGOTT, M.B., B.CH.

ASTHMA, ASPIRIN AND NASAL POLYPI

SIR,

Dr. Bray, in his article in *The Practitioner* for October (1934, cxxxiii, 368) on “ Recent advances in the treatment of asthma and hay fever ” states, quite rightly, that “ aspirin brings great relief in some cases (of asthma) and induces attacks in others.” That aspirin should never be given to certain classes of asthmatics is a fact that is not sufficiently realized, for one not infrequently sees aspirin-sensitive asthmatics in whom very severe and sometimes alarming attacks have been produced by the unwise administration of aspirin. A good rule to remember in this connection is never to prescribe aspirin to an asthmatic patient in whom nasal polypi are present, or from whom nasal polypi have been removed, for it is in these two classes of patients that an attack of asthma will probably be produced. It does not make any difference whether the nasal polypi are present or have been removed, and if in addition there is a low systolic blood-pressure, the harmful effects produced by aspirin are likely to be increased.

I am, etc.,

London, W.1. CLEMENT FRANCIS, M.B.

REVIEWS OF BOOKS

Clinical Science, illustrated by Personal Experiences. By Sir THOMAS LEWIS, C.B.E., F.R.S., M.D., D.Sc., LL.D., F.R.C.P. London: Shaw & Sons, 1934. Pp. viii and 189. Figs. 49. Price 12s.

THIS is a very important and authoritative book on a subject most intimately connected with the future progress of medicine. It sets out fully, and with examples from his numerous investigations, the conception Sir Thomas Lewis, from an experience of a quarter of a century of clinical research, has formed and previously expressed, for example, in his Harveian Oration in 1933 at the Royal College of Physicians of London. It brings clinical science into line with other sciences, and demands a very high standard of accuracy and intellectual rectitude. A more searching examination of existing beliefs is necessary in clinical science than in other sciences, such as chemistry and physiology, for in medicine they are more often based on misrepresentation of facts, unjustified inferences, dogmatic utterances, and over-emphasis of hypotheses. The first chapter describes in concise and most carefully considered sentences the scope and methods of clinical science; this title is more suitable than "experimental medicine," which now suggest too strongly animal experiments, and also than "clinical patholosgy," which savours too much of the test-tube and needle. Clinical science utilizes the investigation of the healthy and diseased, of necropsies and of correlated animal experiments. From the nature of its problems clinical science must have recourse to experiments, and these can be made within carefully and humanely restricted limits on patients; thus Sir Thomas insists that nothing should be done to a sick person which the investigator would not permit in similar circumstances to be done to himself or to his wife or child. The value of animal experiments, so habitual and essential in physiology, has its place in clinical science, especially by showing the results of removal of organs, but the limitations of application are clearly indicated. Those studying human patients should also be in a position to perform animal experiments when necessary, and it is essential that medical research should be carried out both in the wards and in the laboratory, for the cause of human disease never has been, and never can be, found purely in a laboratory; there must be some association, direct or indirect, with patients. These and other important points, the outcome of much clear thinking, are expanded by the contents of the following sixteen chapters which give in a somewhat condensed form a number of researches carried out by Sir Thomas, often in collaboration with others. Among these reference may perhaps be specially directed, as showing the manner in which problems should be approached and solved, to those on auricular fibrillation and flutter, the triple response of the skin to injury, "Raynaud's disease," and erythralgia.

Diseases of the Skin. By S. ERNEST DORE, M.D., F.R.C.P., and JOHN L. FRANKLIN, M.D., M.R.C.P. London: Cassell and Company, Ltd., 1934. Pp. 416. Plates 46. Price 10*s.* 6*d.*

IN their preface the authors of this remarkably compact work state that their original intention was to revise the once popular textbook by the late Sir Malcolm Morris. As might have been expected, however, owing to the clinical and laboratory researches in dermatology that have been pursued all over the world in recent years, revision in the strict sense of the term was impossible, and the present volume must be considered as a new production. It may be said at once that the authors have succeeded in presenting an almost complete review in an astonishingly small compass of the three hundred or so disorders by which the skin may be affected, and some of the more important diseases, such as syphilis, lupus and psoriasis, are considered very fully. As might be expected, the volume is fundamentally sane and sound, and the following criticisms are offered in all friendliness. In the chapter on the neuro-dermatoses and prurigo, the importance of the psychological factor in many cases should have been emphasized, since successful treatment may entirely depend on the ability of the practitioner to unearth the cause of the emotional stress from which the patient is suffering. Indeed a short chapter on dermatological psychoses should be included in the modern textbook owing to the great increase in their frequency in recent years. In the chapter on eczema the authors exclude " all forms of inflammation of the skin caused by chemical or mechanical irritants "; this seems an untenable attitude, with equal reason we might refuse to designate as urticaria the lesions resulting from nettle stings, insect bites, or histamine puncture, restricting the term to an urticarial eruption of internal origin. Urticaria and eczema are respectively dermal and epidermo-dermal reactions of the skin to a great variety of agents and as regards terminology, it is irrelevant whether these be of exogenous or endogenous origin. An eczematous reaction of the skin to external irritants, whether physical or chemical, is far more likely to occur in subjects who by heredity or individual predisposition are liable to eczema of internal origin, paroxysmal rhinorrhœa, asthma, etc., than in those without this tendency. In such a person an outbreak of eczema may be caused by an exogenous irritant, by an emotional disturbance, or by a blood-borne antigen; it is surely irrational to label the eruption eczema in the last two instances and not in the first. In the chapter dealing with diseases of the sebaceous and sweat-glands, it is surprising to see the term " seborrhœa sicca " tolerated, and still more so to find it described as the result of infection of the *sebaceous glands* (sic) with the pityrosporon. Moreover, to regard this organism as the *cause* of the masculine, or so-called seborrhœic type of vertical baldness, is certainly unjustifiable, since this form of loss of hair is a secondary sex-characteristic, often familial, never occurring in eunuchs but sometimes seen in adrenal virilism in women. Successful removal of the tumour is followed by a disappearance of hair from the face and its regrowth on the vertex of the scalp. We have failed to find any account of the important group of eruptions in which exposure to light is a provoking factor (hydroa vacciniforme, summer prurigo, and the relatively common light-sensitiveness of adults)—an inexplicable omission. A valuable list of prescriptions in common use is given in an appendix, and the index is excellent.

Radium and Cancer : A Monograph. By H. S. SOUTTAR, D.M., M.CH., F.R.C.S., Surgeon, London Hospital. London : William Heinemann (Medical Books), Ltd., 1934. Pp. x and 387. Figs. 73. Price 21s.

THE author has now followed up his earlier book on " Radium and its Surgical Applications" by a more elaborate and monographic exposition of the most important therapeutic use of radium, namely, its place in the treatment of malignant growths. This subject is most intimately connected with the ordinary practice of surgery, but very few surgeons could have provided the amount of special information on atomic physics and biochemistry here given in addition to that on pathology and clinical surgery. This work first deals fully with the physics of the atom, radium, X-rays, radio-activity, gamma rays and their difference as regards absorption from that established for X-rays. The apparatus employed for the application of radium at different centres at home and abroad, including beam radiation, are then considered, and then follows a description of the technique of radium applications, namely, by insertion into some natural cavity of the body, by the introduction into the tissues of needles or seeds, or by external application. After chapters on the general principles of radiotherapy and the measurement of the dosage the action of radium on the normal tissues of man are discussed, and here reference is made to the important subject of the possible effects on those engaged in radium clinics. The treatment of new growths in the different systems of the body is then set out, beginning with the skin. It is definitely stated that in the malignant diseases of the tongue and cervix uteri radium treatment has almost completely taken the place of the ordinary surgical procedures. The question of choice between radium and surgery in mammary carcinoma is discussed with an open mind, but the author states that radium can certainly bring about a complete disappearance of all clinical traces of the disease in most of the early operable cases, and that " when this has been accomplished he will be a bold surgeon who suggests that the breast should be amputated for the sake of safety." In rectal carcinoma, on the other hand, radium has on the whole been so disappointing that surgical excision is recommended, and in malignant disease of the prostate radium has not met with conspicuous success, largely perhaps because the growth being slow and of low malignancy is not very sensitive to radium.

Recent Advances in Ophthalmology. By Sir STEWART DUKE-ELDER, M.A., D.Sc., Ph.D., M.D., Ch.B., F.R.C.S. 3rd Edition. London: J. and A. Churchill, 1934. Pp. 430. 3 plates (2 coloured), 150 figs. Price 15s.

IN the third edition of this book the author has retained the subject matter of two chapters only, the remainder consists of accounts and discussions of new subjects of current interest. These he intends to take up again in subsequent editions, describing any further advances that may be made in the interim and thus augmenting this work in its scope and usefulness. Besides scientific matter there is much that will interest and help the clinician in the new edition. The etiology and treatment of retinal detachment, a subject that has received so much attention in recent years since Gonin's work opened the way to the successful treatment of many cases, is admirably described by the author. The morphology and pathogenesis of cataract are discussed, and a well balanced account of the advantages and disadvantages of the extra- and intra-capsular extraction operations is given. Modern methods of operative technique are described. Some recent conceptions about the pathogenesis of glaucoma are admirably surveyed, and points in the diagnosis and treatment of this disease dealt with. There is an interesting chapter about intra-ocular infections and their relation to direct organismal infection, systemic intoxication and allergic sensitization. Keratoplasty, corneal contact glasses and herpes of the cornea are among the subjects which have excited the enthusiasm of clinicians lately. The physiologist and biochemist will find much useful and absorbing information in the chapters on vascular circulation; the nature of the intra-ocular fluid; the vitreous body; the intra-ocular pressure; metabolism of the lens and cornea, and the effect of drugs upon the eye. The book is written in a characteristically lucid style, the literature is ample and the illustrations good.

Green's Manual of Pathology. By H. W. VINES, M.A., M.D. Revised and enlarged. London: Baillière, Tindall and Cox, 1934. Pp. xii and 928. Coloured plates 8, other illustrations 425. Price 25*s*.

THE late Dr. T. H. Green of Charing Cross Hospital first brought out this well-known textbook in 1871 when it contained 304 pages, and and since then it has always been edited by Charing Cross Hospital teachers, such as the late Mr. Stanley Boyd, the late Dr. Montague Murray, and Dr. Bosanquet. After the lapse of sixty-three years little of the original can now remain except the title which piously preserves the original author's name; but from its size and weight the work deserves the name of textbook rather than that of manual. Rather less than half of the volume is devoted to the general aspects of pathology, and the remainder deals systematically with special pathology. The former contains a useful section on the therapeutic applications of immune reactions, in which vaccines, the Schick and Dick tests are described; in the following chapter, on allergy, asthma, hay-fever, serum sickness, and fever are explained. The illustrations, especially the coloured plates, are excellent, a large number of them being taken from Charing Cross Hospital Museum. The printing is good, the price extremely moderate, and, in conclusion, Dr. Vines must be congratulated on the fifteenth edition of this up-to-date textbook.

The Constitution and its Reaction in Health. By T. E. HAMMOND, F.R.C.S. London: H. K. Lewis and Co., 1934. Pp. x and 160. Price 7*s*. 6*d*.

IN this essay the author points out the importance of the constitutional factor in health and disease, thus following others in reviving a conception of the " soil " before the rise of bacteriology in the last quarter of the last century over-shadowed it. Some common-sense advice about laws of health is given and attention is incidentally drawn to the author's experience in the European war. Short chapters are devoted to food, exercise, fresh air and draughts, bathing, the art of convalescence, and the asthenic state and its treatment. The last condition is distinguished from the hyposthenic constitution, of which the late Viscount Grey is stated to have been an example. The author proposes to deal in a further publication with constitution in disease.

NOTES AND PREPARATIONS

PAPWORTH

The Annual Report for 1933 of Papworth Village Settlement, near Cambridge, is a record of increasing usefulness and prosperity. In 1918 Papworth's industries paid £174 in wages and sold £401 worth of goods; in 1933 the same industries paid £25,000 in wages and executed work to the value of £88,000. During the year, the number of hospital beds has been increased, the advanced cases have been rehoused, observation wards have been provided for patients who come for treatment and training and private wards for paying patients; a large new hospital for men has been built and a fully equipped new out-patient department for the housing of the various clinics.

DIET CHARTS AT HARROGATE

The matter of suitable diet for spa patients has recently been carefully worked out at Harrogate. A series of diet charts has been drawn up by the Medical Society, simple in character, and adaptable, with suitable modifications, to most types of diseases met with at the spa. They consist of the following :—(1) A low caloric diet for the reduction of weight; (2) a restricted carbohydrate diet with high vitamin content; (3) a restricted protein diet; (4) a lacto-vegetarian diet; (5) a low fat diet. These are printed in card form and handed in duplicate to the patient—one for his own use, and the other to be given to his hotel. A space is left on the card for alterations and additions to the diet. The aim has been simplicity without excessive detail, in order to bring the scheme within the compass of the smaller hotels and boarding houses in addition to the hotels de luxe. It was thought better not to label the diet charts with the names of particular diseases, but to work on general principles which could be readily adapted to any particular disease. It is suggested that this scheme will remove the reproach levelled against English spas that sufficient attention is not paid to the important matter of diet in connection with the " cure."

RALLIE HEALTHBELT

This apparatus, which is made by the Rallie Health Appliances, 172 Buckingham Palace Road, London, S.W.1, aims at exercising the abdominal (and back) muscles by causing their alternate contraction and relaxation. To achieve this purpose, broad sections of broche are employed, inter-panelled with elastic to permit the belt to tighten and slacken in use. The rollers on which the strands run have a free-moving action, and are fixed on a flexible steel base. The massaging strands are of rubber, covered with a hard-wearing lustre silk, these cause the belt alternately to contract and expand as the hands are alternately thrust from and returned to the sides, thus gently massaging the abdominal (and back) muscles. The apparatus seems to be a handy and efficient method of carrying out gentle and not too violent exercise of the muscles of the abdomen and the back.

ELECTRICAL APPARATUS

We have received from Messrs. Watson and Sons (Sunic House, 43-47 Parker Street, Kingsway, London, W.C.2) two interesting booklets dealing with new electrical apparatus which they manufacture. The first is concerned with short wave therapy, which differs from ordinary diathermy in that the electrodes are not placed in contact with the patient's body. With the short wave method the heating at all depths in the body is comparatively even, and controllable fever temperatures can be obtained at will. This method of treatment is carried out by the " Novotherm " valve-operated apparatus. The " Sunic junior " X-ray unit is a portable X-ray outfit for radiography in the consulting-room, the patient's home, or the hospital ward. It incorporates the well-known "metalix" tube, and is simple in construction and shock proof.

NEW PREPARATIONS

TRIBREK AND ALVAK.—Tribrek is the name which Messrs. Huntley and Palmers (162 Fenchurch Street, London, E.C.3, and Reading) have given to a new breakfast food. It is a distinctly appetizing cereal food, in crisp brown flakes, and is composed only of wheat, milk and sugar. It can be safely recommended to young and old alike. Alvak biscuits are another Huntley and Palmers new preparation; they are stated to be a combination of fruitarian, leguminous and cereal flours blended to give an appetizing product, and certainly they are more than palatable. By virtue of their high natural alkaline ash they may neutralize the acid tendencies of the diet and so may be supposed to make up a calcium or other mineral alkali deficiency, if any be present.

VIONASE.—Vionase tablets are issued by Messrs. Wilcox Jozeau and Co., 15 Great St. Andrew Street, London, W.C.2, and contain medicinal yeast, ferrous sulphate (stabilised), and small amounts of copper and manganese salts. They may therefore be calculated to be of value particularly in the treatment of the ordinary anæmias of microcytic hypochromic type. In addition, the tablets should prove a useful general tonic.

VALERIAN-DISPERT.—Valerian-dispert is one of a series of preparations (manufactured in Germany and marketed in England by Messrs. Coates and Cooper, 94 Clerkenwell Road, London, E.C.1) called Disperts, which are prepared by the Krause desiccation process. It is stated that the solutions used for this process are so finely nebulized by the rotatory atomization that one litre is converted into a surface of 300 metres, and any harmful effects as a result of the drying are avoided. The standardization of valerian-dispert is carried out by utilizing the morphine-like action of a subcutaneous injection of the preparation, on a mouse, one valerian-mouse-unit per gramme of animal constituting the lethal dose-limit. It is put up in the form of dragées, the dose being one to four.

ACETYLCHOLINE BROMIDE.—A sterile stable solution of this substance has been issued by Burroughs Wellcome & Co., Snow Hill Buildings, London, E.C.1, in ampoules each containing 1 gramme in 1 c.cm., in boxes of ten. Acetylcholine is the acetyl ester of choline; it has been isolated in chemically recognizable quantities from the spleen and from the placenta, and is present in minute traces in other organs. The manufacturers state that it has proved particularly successful in counteracting paralysis of the intestine such as occurs after laparotomy and intestinal operations.

THE PRACTITIONER

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THE TREATMENT OF HERNIA

By GEOFFREY KEYNES, M.D., F.R.C.S.
Assistant Surgeon, St. Bartholomew's Hospital; Consulting Surgeon, City of London Truss Society.

HERNIA in its various forms is so common an affliction of humanity that every practitioner and surgeon feels himself to be on familiar terms with it, and is apt therefore to believe that its treatment is both easy and uninteresting. The facts remain, however, that of the two main methods of treatment, by truss or by operation, the one is largely in the hands of instrument makers whose surgical knowledge is scanty, and the other is unsuccessful in a large proportion of patients.

TREATMENT BY TRUSS

Treatment of hernia in adults by means of a truss is in a sense an acknowledgment of surgical failure. Patients are, however, still entitled to choose for themselves, and even in these days there is a large number of individuals who prefer instrumental treatment to surgery, many of the younger patients, when advised to have an operation, replying, "Yes, but a friend of mine was operated on less than two years ago, and already he has a recurrence." This plea is difficult to answer, and it must be admitted that a properly made truss applied to the right type of patient can often be a satisfactory solution of the problem. Many people with minor degrees of hernia have indeed been made comfortable by the use of an "appliance" consisting of elastic bands holding in position a pneumatic pad. Their effective use, however, is far more limited than the manufacturers' advertisements lead sufferers to suppose, and much harm is done by attempts to control difficult hernias by means of these inefficient and very perishable instruments. Probably their chief field of usefulness is in treating cases of incipient or incomplete hernia, or in giving mental satisfaction to neurotic people who, noticing an inguinal bulge really due to lax muscles, have interpreted this as a "rupture" without reference to their medical attendants. The profession should therefore be very cautious in prescribing such appliances, remembering that most patients with real hernias demanding treatment by an instrument will be better advised to use a good steel truss, which is both effective and durable.

The requirements of a steel truss are many, and it is clear that a properly constructed instrument cannot be made cheaply, a fact which explains much of the popular prejudice against steel trusses. A visit to the chemist for a cheap truss usually results in the purchase of an article which offends in almost every particular against the canons of truss-making with the natural consequences of discomfort and disappointment. The basis of a properly made truss is a steel band cut on the curve out of a metal sheet and then carefully tempered by hand. Only in this way can the correct tilt and even pressure be obtained, and, although a standard instrument in a series of standard sizes can be made to suit the average lesser degrees of hernia, yet an immense amount of variation must be introduced for adequate treatment of large hernias, direct or sliding hernias, and so forth. It is obviously true that no two patients are exactly alike, and it follows that innumerable variations in the instruments must be made possible if they are to be comfortable and efficient. Furthermore, the basis of correct treatment is a correct diagnosis which can only be made by a medical practitioner. The correct instrument can then only be made by a firm possessing specialized knowledge of the complicated problems involved and technical methods elastic enough to enable the truss to be made rather for the individual than by "mass-production."

This view that I have outlined of the responsibilities of the medical practitioner and instrument maker in the supply of trusses may sound a trifle too solemn for ordinary application. It is based, however, on eleven years' experience at the City of London Truss Society, an institution which has specialized in the supply of trusses to necessitous patients for over a hundred years. Consideration of the individual problems of many thousands of patients has shown me the value of close collaboration between practitioner and instrument maker, and impressed upon me how much suffering and waste of time and money are caused by the indiscriminate supply of chemists' trusses and quack "appliances" for the treatment of hernia. Perhaps the medical profession is not altogether blameless, since not all its members quite realize the importance to the patient of supplying very accurate measurements and details of the case to a first-class instrument maker. In a difficult case matters will always be made easier if the patient can be seen by the instrument maker as well as by the practitioner.

It is impossible in so comparatively brief an account as this to describe in detail all the varieties of truss that may be required. For inguinal hernias the main kinds will be the "ordinary" (Figs. 1 and 2) the "rat-tail" (Fig. 3), and the "forked-tongue" trusses (Figs. 4 and 5) as illustrated in the accompanying figures. Any of these may be required double, or with combinations of any two of them for hernias of different degrees on the two sides.

For femoral hernia, the truss should be similar except that the pad should be set at a slightly lower angle (Fig. 6) so as to bring it over the saphenous opening. A "hollow-pad" may be necessary for irreducible hernias. There is no truss for femoral hernias quite corresponding to the "rat-tail" or "forked-tongue" for inguinal hernias. The best modification of the truss for large femoral hernias has a triangular pad with straps round the thigh to keep it in position (Fig. 7). The spring in a femoral truss should usually be lighter than that in the corresponding inguinal truss. If, therefore, a patient has an inguinal hernia on one side and a femoral on the other, each half of the spring should be tempered to a different strength.

For an umbilical hernia, if small, the spring should have no tilt, and the pad should be fixed on a flat circular plate of somewhat greater diameter than the hernial orifice (Fig. 8). For large umbilical hernias a heavy spring carrying a "rim-plate" with a diaphragm of chamois leather and three straps will usually give more support than a belt (Fig. 9). For very large hernias, however, an instrument may be so bulky and heavy that a belt may be more easily worn, though less efficient in supporting the hernia. Post-operative hernias, either suprapubic or in the iliac fossa, are usually very difficult to treat with trusses. A suprapubic truss must have a curve at the anterior superior spine of the ilium (Fig. 10) if it is to maintain pressure in the correct place. The interstitial truss (Fig. 11) sometimes serves for a hernia through an appendicectomy wound.

With these types of truss, combined or modified, it should be possible to control most of the hernias ordinarily encountered, but it is necessary to add the so-called "bag truss" (Fig. 12), which sometimes has to be used when the control of a large scrotal hernia becomes frankly impossible. This, as can be seen in the illustration, provides a support for the scrotum, and will greatly lighten the patient's burden. The existence of such appliances is a reproach to

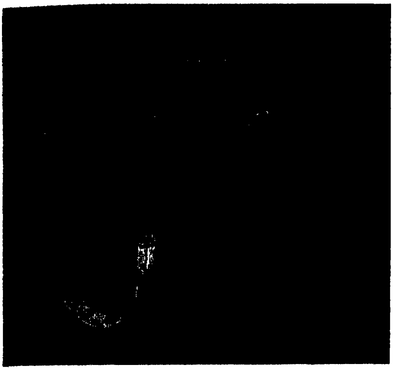

FIG. 1.—Ordinary right inguinal truss.

FIG. 2.—Ordinary double inguinal truss.

FIG. 3.—Right rat-tail (mild scrotal) truss.

FIG. 4.—Left forked-tongue (severe scrotal) truss. Similar to Fig. 3, but with forward prolongation and double control.

FIG. 5.—Double forked-tongue truss.

FIG. 6.—Right femoral truss.

FIG. 7.—Right femoral truss with thigh belt.

FIG. 8.—Ordinary umbilical truss.

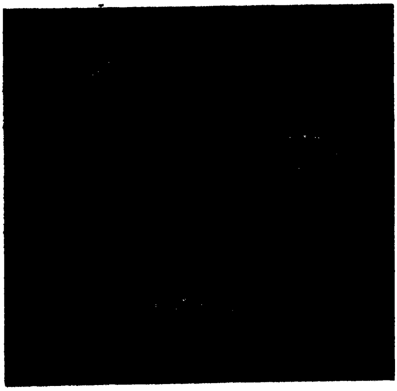

FIG. 9.—Umbilical or ventral rimplate truss.

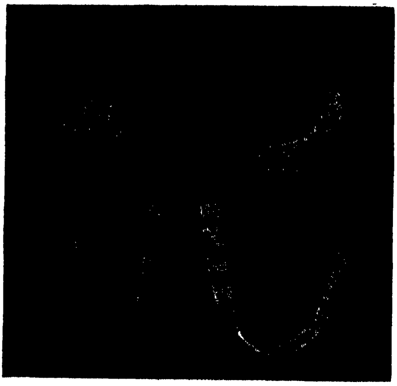

FIG. 10.—Left supra-pubic with cresto-iliac curve truss.

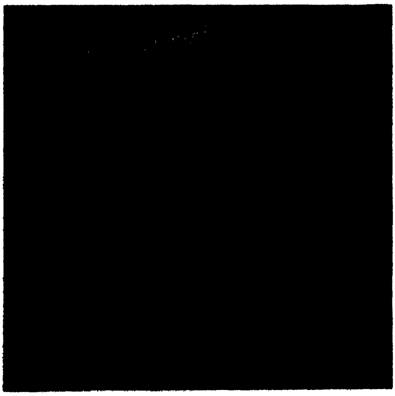

FIG. 11.—Right interstitial truss.

FIG. 12.—Bag truss.

surgery, and the remainder of this article will be an enquiry into exactly what are the limitations of surgery in dealing with hernia.

TREATMENT BY OPERATION

Instrumental treatment of hernia is palliation; operation is, or ought to be, cure. There can therefore be no doubt as to which course is the better if circumstances permit. The operation for the average indirect inguinal hernia in young men has been virtually standardized, the modified Bassini operation being favoured by the majority of surgeons. The results are regarded with complaisance by most operators, the belief that the patient is practically always cured being widespread. Unfortunately this belief is ill-founded, being based on " impression " rather than on facts established by careful following-up of patients for several years after operation. Max Page in a recent discussion at a meeting of the British Medical Association brought forward evidence to show that even among the most favourable type of patient there was actually a recurrence rate of 20 per cent. for indirect, and 25 per cent. for direct hernia, a fact which should destroy complaisance and stimulate interest in the technique of a supposedly simple operation.

The causes of so large a proportion of failures are difficult to determine, but it is probable that they are due both to technical errors on the part of the surgeon, and to premature resumption of full activity on the part of the patient. The second cause is difficult to eliminate among wage-earning patients, and must therefore stimulate the surgeon to examine and improve his technique with a view to avoiding failures. It seems likely that an appreciable proportion of these failures are due to too rigid a routine in surgery, the same operation being performed for varying degrees of indirect hernia and for conditions differing as widely in their anatomical characters as direct and indirect hernia. Again, therefore, success must depend in the first place on an accurate clinical diagnosis, and in the second place on an operative repertory which is varied enough to deal successfully with difficult or unexpected situations whenever they arise. In the young adult with a small hernia complete removal of the peritoneal sac and secure ligaturing of the neck should produce a cure. If this be carried out with the minimum degree of trauma and displacement, the relations of the parts are virtually normal, and no further interference is required.

If the relations in the inguinal canal have been appreciably disturbed, then the Halsted operation becomes necessary, the lower edge of the internal oblique muscle being approximated by two or three mattress-sutures over the cord to the inguinal ligament. Many surgeons believe that the modified Bassini operation, in which the suturing is done under the cord, gives greater security. If the deep inguinal aperture has been seriously stretched by the descent of the hernia then the posterior wall of the inguinal canal is correspondingly deficient, and a more elaborate procedure becomes necessary, the deficient posterior wall being repaired with the help of a plastic flap from the internal oblique layer of the anterior rectus sheath. Further variations will be necessary if the deficiency is very large, or if the hernia is of the direct variety. These include the use of a strip of fascia derived from the edge of the upper flap of the external oblique aponeurosis for suturing the tissues, or of several strips of suture material taken from the fascia lata of the thigh. Additional difficulty will be encountered if, as is not infrequent in the larger scrotal hernias, part of the large intestine is incorporated in the wall of the sac. This will be the cæcum and ascending colon on the right, and pelvic colon on the left, the result being the so-called " sliding hernia," which effectively prevents the complete eradication of the sac. In these circumstances cure depends entirely on the operative reconstitution of the abdominal wall, and usually the employment of strips of fascia lata is essential. The same applies to all the larger direct hernias, a variety of hernia which, as already stated, is a prolific cause of recurrence after operation.

Obviously these more complicated operations introduce a larger element of technical skill and judgment, and the patient has the right to expect the surgeon to have these at his command. Often the patient is discouraged by being told that he is too old, that his tissues are too "poor," or that, if he is subjected to operation, he must wear a " light truss " afterwards. Actually the limitations of successful operation are very few if adequate surgical technique is combined with careful choice of anæsthetic. Many of the patients are elderly, obese, and subject to chronic bronchitis, so that there will be an important place for the use of low spinal anæsthesia, with percaine, or local analgesia with novocain. Percaine is specified, because the operation is often very prolonged, and cannot be hurried, so that the drug of which the effects last the longest will be the best. Local analgesia is also satisfactory, and can be used even for the largest hernia, so that even the elderly patient with chronic asthma and bronchitis can be made safe, given sufficient skill and patience on the part of the surgeon. In the accompanying figures (13–16) examples are given of hernias that have been cured by careful attention to these details. The only patients who cannot be cured by operation are those whose general condition is so infirm that any operative interference, however carefully planned, would ensure their death, and those whose hernias are so large that the contents of the sac cannot be returned to the abdominal cavity. The latter condition must be exceedingly uncommon, perhaps because the contents of the sac usually consist partly of omentum which can be removed.

Femoral hernia, though rather less familiar to the average surgeon, is probably easier to cure. Even the old-fashioned "low" operation in Scarpa's triangle, with its unsightly vertical scar, results in a large proportion of cures. The necessity for operation in femoral hernia is greater even than in inguinal hernia owing to its greater liability to strangulation. Closure of the crural canal is effected from below by suturing the inguinal ligament to the ligament of Astley Cooper, or, more effectively, from above in the "high" or inguinal operation by suturing the lower edge of the internal oblique muscle, or a flap from the rectus sheath, to the same ligament. Large femoral hernias are uncommon, but when they occur can be cured by means of fascial strips from the thigh.

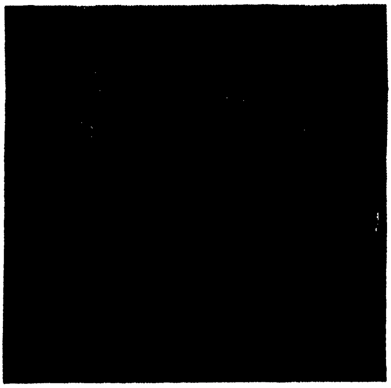

Fig. 13.—Double indirect hernia.

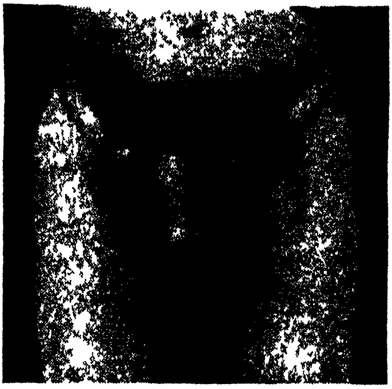

Fig. 14.—Double direct hernia.

Umbilical hernia in adults constitutes one of the most difficult problems in the surgery of hernia. So often the patient is an obese woman with high intra-abdominal tension, which tends to increase rather than decrease as time passes. The opening may be closed horizontally or vertically, and is preferably done with the help of fascial strips from the thigh, but whatever technique be used there is a great tendency to recurrence. Often, however, the patient is incapacitated by the hernia and the danger to her life from strangulation is considerable, so that cure must be attempted. Umbilical hernia offers a difficult field for surgical technique, which is undoubtedly capable of improvement.

Post-operative hernia in all its forms is all too common, and being almost always difficult to control by truss or belt, must usually be dealt with by operation. There are scarcely any limits set by the size of the hernia to the possibility of cure, but this depends wholly on infinite patience and care in technique, combined with the right choice of anæsthetic. The essentials in technique are exact definition of the deficiency, excision of all scar tissue, and meticulous suturing of the abdominal wall according to its proper layers. In every large hernia suturing should be done with fascial strips, even muscles, such as the recti abdominis in a midline sub-umbilical hernia, being approximated with a fascial strip not pulled too tight. Every hernia must be considered as an individual problem *after* the layers have been defined and freed of scar tissue rather than before operation. It is often impossible to know even approximately how large the deficiency

Fig. 15.—Large femoral hernia.

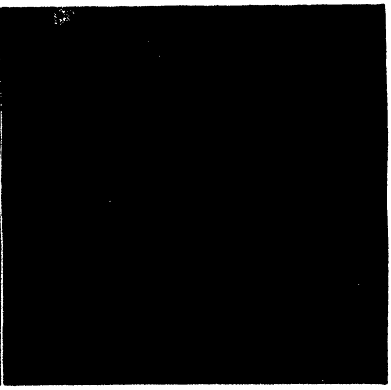

Fig. 16.—Post-operative ventral hernia.

is until this has been done.

Figs. 13 to 16 exemplify extreme types of hernia (double indirect, double direct, femoral, and post-operative) which have been cured by operation.

SUMMARY

The treatment of hernia, whether by truss or by operation, is far from simple. The successful application of a truss demands accurate diagnosis by the practitioner followed by intelligent cooperation on the part of an expert instrument maker. The use of cheap chemist's trusses and quack "appliances" should be deprecated. Treatment by operation is at present followed by too large a number of recurrences, and complaisancy as to results is misplaced. With development and variation of technique, both surgical and anæsthetic, almost every hernia can be cured by surgery; but success can only be achieved by applying careful thought and attention to detail in every patient, rather than by the performance of any routine operation.

THE TREATMENT OF HERNIA IN CHILDREN

By L. E. BARRINGTON-WARD, Ch.M., F.R.C.S.
Surgeon, Hospital for Sick Children, Great Ormond Street; Senior Surgeon, Royal Northern Hospital.

THE common varieties of hernia in children are inguinal and umbilical; femoral hernia is rare. In considering the treatment of hernia, it is well to bear closely in mind the nature and cause of the deformity.

Inguinal hernia in childhood is due to the failure of the normal obliteration of the processus vaginalis. Usually the upper part of the processus vaginalis becomes obliterated at or soon after birth, and no space is left into which the abdominal contents can enter. If the processus is completely shut off from the peritoneal cavity hernia cannot occur. If the processus is not shut off there is an opening in the peritoneum and a potential space along the cord into which omentum or intestine can descend and constitute a hernia. It must be clearly understood that an inguinal hernia in the child is not due to any weakness or abnormality of the abdominal muscles: it is solely due to the persistence of a congenital sac. Any treatment must therefore be directed to the obliteration of this sac. The most sure way is to operate and remove the sac, closing the opening into the peritoneum, but surgical interference is not always necessary, because there is considerable evidence to show that in the early months of life the normal process of obliteration will continue, provided that nothing is allowed to enter and open up the sac.

In infants the opportunity of natural cure should always be accepted. First, all causes raising the intra-abdominal pressure must be removed and every avoidable cause of straining must be eliminated. Phimosis is common in these cases and circumcision is often required. A congenital smallness of the meatus —pin-point meatus—is often overlooked and is a fruitful source of straining. It is treated by meatotomy. Constipation, diarrhœa, intestinal indigestion, worms and fissure should receive the appropriate treatment. Secondly, to permit obliteration of the sac, nothing must be allowed to enter from the abdomen, and the only way to ensure this is by fitting an adequate truss. A truss should execute firm and continuous pressure over the internal abdominal ring. In infants a skein of wool is often used, but even when applied properly it is inefficient, and it is quite beyond the average mother or nurse to master its regulation. Under the age of three months the rubber horseshoe truss is easy to apply, comfortable to wear, and successful in controlling most hernias. Over three months a rubber-covered spring truss is more satisfactory. Various belts with pads are sold by chemists, but they do not keep pressure in the proper place or in the proper direction. It may be found even in a single hernia that a double truss sits more comfortably. The truss must be worn continuously, and for bathing and cleaning purposes two trusses are advisable. The mother or nurse must be instructed how to exert pressure on the inguinal canal with the finger to prevent the appearance of a hernia whilst changing the truss.

The question is often asked: When can a hernia be considered cured after wearing a truss? Can it ever be considered cured? It is a difficult question to answer, for, short of operation, there is not any way of knowing whether obliteration of the sac has occurred. It is in everyone's experience that a patient may not have shown any sign of a hernia in infancy or early childhood and yet develop a hernia in later life, due unquestionably to the presence of a congenital sac which had persisted from birth. Or a hernia may have shown itself once or twice in infancy, not to appear again until some years have elapsed. For practical purposes it may be taken that if a hernia first seen in infancy has been adequately controlled by a truss for six months and, after a further six months observation without a truss, has not been seen, a cure may be anticipated. The indefinite wearing of a truss should be deprecated. It is irksome to the growing child, and if it has not effected a cure within six months it is unlikely to do so later. It is better to face the facts and adopt more certain measures for curing the hernia while the child is still young. There is no more satisfactory procedure than operation for an inguinal hernia in childhood. It can be performed at any age; it should not carry any risk to life, nor any chance of recurrence. It should be the method of choice in all children of one year of age and upwards. Under one year it should be performed (1) if the hernia is large and difficult to control with a truss, (2) if at times it is difficult to reduce, (3) if strangulation is threatened. The operation is simple in scope and only aims at removing the sac completely. The manipulation of the delicate tissues of the cord requires some experience, and the operator requires to be certain of the anatomical structures with each step of the operation. It is not an operation to be undertaken lightly by the occasional operator. Facility is only gained by constant practice.

An incision is made over the lower half of the inguinal canal and the external ring is exposed and defined. One by one the coverings of the cord are picked up with forceps and divided. First the intercolumnar fascia, secondly the muscular cremasteric fascia, and thirdly the thin internal spermatic fascia. The veins and vas will now be visible lying on the sac. The sac is picked up with forceps and by gentle blunt dissection the vas and vessels are peeled off the sac. The sac is thus freed from its surroundings and cleared up to its neck. It is opened to determine that it contains nothing and it is then ligatured as high up as possible and the excess is cut away. The stump will retract out of sight and the operation is concluded by a catgut stitch through the subcutaneous tissues and a few clips to the skin. A simple seal is used as the dressing, and the patient is kept recumbent for a week.

Strangulated hernia is rare in childhood. It occurs most usually in infants from six weeks to three months of age. The hernia appears suddenly as a tense irreducible scrotal swelling. The features of intestinal obstruction—pain, vomiting and constipation—are noted and abdominal distension follows. No time must be lost by attempting even the mildest taxis or posture : operation should be undertaken at once. By dissection the constricting band is exposed and divided—the sac is identified and opened—the contents are inspected and dealt with according to their condition. The same principles will guide the surgeon as in the similar condition in adults, but fortunately in children the intestine appears to have more vitality, and gangrene is uncommon. Finally, the sac is dissected out and removed flush with the peritoneal cavity.

Irreducible hernia may occur at any age, but it is more common in the early years of childhood. A hernia, generally a large one, which has not been controlled by a truss, does not reduce itself on recumbency in the usual manner. There is a tense scrotal swelling which is slightly tender. The child does not show any of the symptoms of strangulation, but gentle manipulation cannot effect reduction. The foot of the bed must be elevated on blocks and an icebag is placed over the hernia. A minim or two of tinct. opii soothes the fractious child. In a few hours with muscular relaxation reduction will occur spontaneously. If signs of threatened strangulation present, operation must be performed without delay.

Hernia accompanied by imperfect descent of the testis.—The presence of an imperfectly descended testis modifies the treatment of a hernia. At no stage can a truss be advised. The truss, if it controls the hernia, will prevent the descent of the testis. In infancy it is better to do nothing provided there is no tendency to irreducibility or strangulation. Operation at this age can be performed if the hernia proves troublesome, but the prognosis for the testis is better if operation can be postponed until the age of three or four.

Inguinal hernia in the female.—The treatment of hernia in the female differs only in anatomical details from hernia in the male. The same kind of truss is employed and a similar operation is performed. The absence of the cord renders the operation easier. In my experience a truss rarely effects a cure.

Umbilical hernia.—The common hernia of infants undergoes spontaneous cure in about 50 per cent. of the cases. Treatment must be directed to the abolition of any cause for straining and increased intra-abdominal pressure. Phimosis, intestinal indigestion, and rickets must be corrected. Rubber belts, so often purchased by mothers, are useless, and if they possess a conical projection to fit into the umbilical ring they are harmful. The essence of non-operative treatment is to bring the recti together so as to enable the umbilical opening to contract and close of itself. This is best achieved by broad overlapping strips of elastoplast applied from side to side. Every two or three weeks the strapping will require to be changed. Stress must be laid on the importance of keeping the hernia continuously reduced, and when the plaster is changed the opening should be controlled with the fingers. A sudden cry with protrusion of the hernia will undo the care of months. In an average case six months of continuous strapping will be required to effect a cure. If the hernia persists beyond the age of three it is unlikely to get well without operation. Some of the details of the operation are open to discussion. Attention has been directed to the importance of preserving the umbilical cicatrix in all cases, to prevent the possible development of psychological reactions in childhood and young adult life. It is suggested that the individual who has a lineal scar, instead of an umbilicus, may suffer from various repressions. This may be true in some cases, but nature is not always at her best in fashioning an umbilicus, and too often the depression is so deep and convoluted that cleanliness is almost impossible and infections are prone to recur from time to time even with scrupulous hygiene. In a normal individual possibly a clean neat scar is preferable. If the umbilical scar is shallow it can be preserved with advantage.

A longitudinal incision is made in the mid-line, which just skirts the umbilicus in its middle part. The skin is reflected as a flap and the umbilical skin is dissected off the peritoneal sac. The ring is defined and the fascia is incised for half an inch upwards and downwards. The peritoneal sac is opened, its contents reduced, and the neck of the sac is then closed by ligature or suture, depending on its size. The edges of the fascial opening are freshened and united by a continuous catgut suture. The skin flap is replaced and sutured, restoring the umbilical irregularity to its normal position.

If the umbilicus is much puckered it is best excised by an elliptical skin incision as the first stage of the operation. I believe the disadvantages of this procedure are exaggerated.

Femoral hernia is not often met with in children. It is usually bilateral and shows no partiality for either sex. Treatment by truss is even more unsatisfactory than in the inguinal variety, and operation should always be recommended. The sac is best removed by an incision above Poupart's ligament, this enables ablation to be performed at the highest point with no dimple on the peritoneum left at the upper opening of the femoral canal. No interference with fascia or muscles is required.

HERNIA AS A SURGICAL EMERGENCY

BY NORMAN C. LAKE, M.D., M.S., D.Sc., F.R.C.S.
Senior Surgeon, Charing Cross Hospital.

THE conditions under which a hernia may become an urgency, if certain rare complications are excluded, are inflammation, incarceration and stangulation. The first of these terms, which is now seldom used, was formerly applied to cases in which the sac and its contents became inflamed without strangulation. In such cases the inflammation may be secondary to infection of thin overlying skin, or may arise from some structure contained within the sac, e.g. the appendix. In the majority of cases, however, inflammation of a hernia is merely a concomitant of strangulation and will be considered as such. An incarcerated or obstructed hernia is one in which the passage of the contents is seriously interfered with mechanically but without any obstruction to the blood vessels. The included loop of bowel becomes distended with gas, and the pressure within the sac eventually reaches a level sufficient to obliterate the veins and then the arteries, so that strangulation frequently follows.

For very obvious reasons a hernia is more likely to become obstructed when the contents of the bowel are solid or pultaceous, and obstructed hernias are common in the umbilical type in which the colon is involved. Occasionally, however, the same changes occur in a large inguinal sac, indeed the distinction between incarceration and strangulation is not well marked; it is probable that almost every strangulation starts as an obstructed hernia, the vascular involvement in the ordinary case being early, whereas in the true obstructed type vascular changes may be delayed for a considerable period. Closely bound up with this difference is the question of long-standing adhesion of the contents to the sac, for where considerable adhesions are present the bowel is able to acquire an adventitious blood supply, and so the onset of strangulation is postponed. It need scarcely be mentioned that mere irreducibility is not sufficient evidence of incarceration, unless it be known that the hernia has previously always been easily reducible, and the patient shows signs of interference with the bowel functions. Irreducibility without incarceration may be due to adhesions, the great size of a hernia, or the fact that it is of the sliding type (*hernie en glissade*), while in some cases the contents consist entirely of omentum.

CLINICAL AND PATHOLOGICAL TYPES OF STRANGULATION

The clinical and pathological types of strangulation run more or less parallel, some being very complete and urgent, and others subacute, partial and oftimes misleading. The mechanism of strangulation, as has been suggested above, starts with the production of an obstructed hernia. This obstruction may be due to the sheer incarceration of the semi-solid bowel contents, when the colon is involved; but in many inguinal and femoral cases it is produced when, during some sudden strain—sneezing, coughing, straining at stool or lifting, an extra piece of gut is driven into the sac. The increased length of bowel in the sac means that a larger amount of mesentery has to be accommodated at the neck and the additional pressure completely isolates the lumen of the contained loop of bowel from that above and below. The loop now further expands, partly owing to the retention of gases, partly to exudation and partly to the venous œdema, and so a vicious circle is established. The zone where the maximum pressure is set up and the contents are nipped is commonly narrow, and when this is adequately divided at operation the bowel can usually be returned with ease. In the case of an inguinal hernia the constricting band is usually a thickening of the transversalis fascia at the neck of the sac, which is frequently pulled down as the swelling develops until it occupies a position near the external inguinal ring; in a femoral hernia the constricting band is usually Gimbernat's ligament. While these are the general findings it must not be overlooked that at times the strangulation is produced within the cavity of the sac by the presence of intra-peritoneal bands and adhesions. This is very commonly the case in a para-umbilical hernia, in which multiple adhesions dividing the sac into many loculi are almost invariable; occasionally, in this type of hernia, a coil of small intestine may make its way into a loculus and become strangulated there; in turn, by its swelling, it presses upon the contained colon, which is forced against the sharp edge of the lower margin of the aperture formed by the aponeurosis, and so also strangulated. The urgent symptoms of small intestine obstruction, so unlike those of ordinary umbilical incarceration, may be very misleading in such cases.

DIAGNOSIS

The diagnosis of strangulation depends upon two factors, the presence of intestinal obstruction with its signs and symptoms, and the detection of a hard and tender mass at the site of a hernial orifice. The first alone is obviously not sufficient to establish the diagnosis, but, nevertheless, in many instances it is the only factor present; this is always the case when the hernia is an internal one, and is not infrequently so in a small femoral hernia in a fat woman. Conversely, however, the discovery of a hard tender lump at a hernial orifice does not suffice to diagnose strangulation, since this may be caused by a mass of omentum, an inflamed overlying lymphatic gland, a bursa, an abscess or a torsioned testicle. True strangulation of omentum can occur without any evidence of intestinal obstruction; very often, however, the omentum is adherent to the wall of the sac and has already acquired an adventitious blood supply, and so its vitality is maintained. Still more deceptive are the cases in which a part only of the circumference of the wall of the gut is involved—Richter's hernia. Here the evidence of intestinal obstruction is not complete; vomiting, except for the reflex type, may be delayed, constipation is not absolute, and in some cases it may be difficult to be certain that there is an organic obstruction present. When the local signs are well marked, however, the diagnosis is not too difficult, but in a fat woman with a small buried femoral canal (for most of the Richter's type are femoral), there may be practically no local signs, and then the diagnosis cannot be made with precision. Whereas the recognition of an ordinary strangulated hernia is straightforward enough, the same cannot be said of the special types in which diagnosis is full of pitfalls.

Of the rarer types of hernia, the interstitial and the bilocular may prove very misleading, the former owing to the absence of any obvious swelling, and the latter because the reduction of the hernia from the superficial to the deep loculus gives rise to the impression that the condition has been remedied, and so in a sense of surgical security the necessary watchfulness is discontinued. Still more interesting, though incomparably rarer, are those cases in which two loops of intestine are involved in the sac, while the intervening loops, obviously equally obstructed, remain within the abdomen.

The special features of the intestinal obstruction due to strangulation of the ordinary type are the sudden onset of the symptoms associated with local pain and tenderness, and a generalized abdominal colic. The initial vomiting is due to a splanchnic reflex, and there may be a short latent interval before the forcible ejection of the contents of the upper intestine completes the picture. At first this consists of bile-stained thin fluid, but this is followed by the yellow foul-smelling contents of the small intestine, often referred to as fæcal vomiting. The intensity and precipitancy of the vomiting will depend upon the level of the bowel involved, being more severe the higher the site of the lesion, but it is also affected by the initial completeness of the obstruction. Frequently, as has been indicated, the case starts as an incarceration, and it is only when the swelling and exudation due to venous obstruction have occurred that the block becomes complete, and is associated with forcible vomiting. For this reason a femoral hernia usually gives rise to more violent symptoms than an inguinal, as it contains small gut and the obstruction rapidly becomes complete, whereas an inguinal one, especially if on the left side, may be occupied entirely by colon, and here incarceration may long precede any actual strangulation. In the case of the rather frequent sliding hernia in this situation true strangulation is almost impossible, since the blood supply reaches the bowel along the wall of the sac, but incarceration is quite common. The case of a para-umbilical hernia deserves special attention, for here the mass is formed of omentum with a limited amount of transverse colon. The former contracts multiple adhesions to the wall, which not only render the hernia irreducible, but also sub-divide the main sac into a number of smaller pouches. Commonly such a hernia becomes incarcerated rather than strangulated, since the contents of the colon are pultaceous and more difficult of disposal than the fluid contents of the small intestine. When occasionally a loop of small intestine becomes strangulated in one of the sub-divisions, as mentioned above, true strangulation of both the small and large intestines occurs at the same time. Strangulation in the case of internal hernia can rarely be accurately diagnosed, although the preceding history may sometimes afford a clue; usually the cause is discovered only at a laparotomy, performed for an obstruction of unknown origin.

PROGNOSIS

The prognosis of strangulation depends upon so many factors that it is impossible to give an unqualified estimate. Spontaneous recovery, although much too hazardous to anticipate, is nevertheless rarely the termination of an attack. Older accounts relate the spontaneous relief of the obstruction by the external bursting of the swelling, and the formation of a fæcal fistula, even the natural closure of such a fistula, and this may act as a pointer to the surgeon faced with a very desperate case in which nothing more than a simple incision dare be attempted. Certainly, in one such case, recovery followed, but I have seen more cases in which repeated attacks of fæcal vomiting and collapse, associated with strangulation of a femoral hernia (usually Richter's) have been recovered from by the bowel slipping safely back into the abdomen, the strangulated zone sealing itself off efficiently, as was seen at subsequent operation. In one such operation, the scars of no less than a dozen previous attacks were found on the bowel wall, corresponding exactly to the patient's history of such attacks. The risks, however, are too great to permit of an expectant attitude, for statistics obtained from various sources place the mortality at from 20 to 40 per cent. Faced with an irreducible, and perhaps incarcerated, hernia the medical attendant has therefore great difficulty in knowing what policy to adopt. Many would advocate immediate operation in all circumstances, and in the case of a patient admitted to hospital this is quite a wise policy, but from the practitioner's point of view I believe that a less strict attitude can be adopted. Many patients, while not wishing to take undue risks, nevertheless object to any suggestion of operative treatment unless it can be demonstrated to be absolutely necessary; sometimes this reticence has a psychical or emotional basis, but frequently there is some physical defect which renders them rather poor operative risks, and the practitioner must then respect such reticence. Further, the economic aspect cannot always be put aside lightly except in the face of very serious risks. On the other hand, the dangers of even a temporary delay must not be minimized, and it is necessary to hold the balance very carefully if the patient is not to suffer from a false decision.

TREATMENT

The cautionary attitude of modern writers overemphasizes the risks of a little delay, for it is certain that every practitioner could tell of many cases in his experience in which the adoption of a waiting policy for a few hours has meant the avoidance of an operation, perhaps altogether, or at least until circumstances are more propitious. Taxis, very heartily condemned by most surgical writers, still has its place in the early treatment of strangulation, but it must be used skilfully and with great circumspection.

Cases in which the bowel has been torn across, or the hernia returned *en masse* to the abdomen are unlikely to occur unless taxis is applied at a late stage or with great force, in other words unless two of the axiomatic rules are ignored. Before taxis is attempted the patient must be placed in such a posture that the musculature surrounding the aperture is relaxed, and the intra-abdominal pressure on that region relieved as much as possible. In inguinal and femoral hernias this is achieved when the patient, with the thighs flexed on the abdomen, lies on his back with the buttocks raised. Cold compresses or ice-bags are now applied locally, and at the same time an injection of morphine (usually not more than a quarter of a grain), is given. A concentrated solution of magnesium sulphate run into the rectum is also valuable in reducing the œdema of the tissues at the neck of the sac. At the end of an hour or two, if the hernia has not already returned, very mild uniform pressure is applied with the fingers for several minutes to reduce further the swelling and œdema, and then gentle efforts are made to return the contents, starting as near the neck of the sac as possible and having regard to the course along which the hernia has descended. This will obviously be more difficult in a femoral than in an inguinal hernia and for this reason taxis is less likely to be effective here and should not be persisted in to the same extent. If the trial fails, or the patient's symptoms get very much worse in the waiting interval, operation may be undertaken with the assurance that the hernia will not disappear as the first incision is made, a rather ignominious event when it has been asserted that only operation can save the patient's life. When the surgeon is prepared to operate, taxis may again be attempted under anæsthesia and, if muscular relaxation is good, is sometimes successful. If in these circumstances the hernia is reduced, the question of proceeding with a radical cure will arise, and the decision often depends more upon economic and sociological than upon surgical factors. There is no doubt that a cure attempted when the tissues are inflamed and œdematous is less likely to be radical than one performed in the quiet period, but it may be felt that the opportunity should be seized of getting as good a cure as is possible.

It is perhaps worth while to repeat that taxis should not be undertaken in the presence of real intestinal vomiting or when the strangulation is of considerable duration, say over six hours; that it should be tried only after posturing and the other adjuncts have been used; that it must be done skilfully and gently, perhaps under anæsthesia; and that it is much more likely to succeed in an inguinal than in a femoral hernia.

Once operation has been proved to be necessary there should not be any delay in its performance, for there is no doubt that in all cases of intestinal obstruction the patient is much worse than he looks or feels. The depletion of fluids and chlorides, the toxæmia and the splanchnic shock are resisted well for a time, but when the ultimate collapse does come it is rapid in onset and difficult to control. To some extent these untoward features may be combated by the administration of intravenous gum saline and anti-gas gangrene serum, either before or during the operation. When a general anæsthetic is to be given, it may be advisable to wash out the stomach, although this simple procedure is not without the risk of collapse in feeble patients. Frequently, however, chronic pulmonary condition or urinary difficulty has been a predisposition to the strangulation, and in these cases the operation may be performed under spinal analgesia, which incidentally is often a great aid to spontaneous reduction. In the aged and in patients with a very low blood pressure spinal analgesia should not be employed, the ideal in these cases being local analgesia. In the orthopnœic patient the flexion of the thigh upon the abdomen renders access to the groin very restricted, and in some of these cases it may be advisable to risk a general anæsthetic, despite the patient's condition, in order to facilitate a rapid operation.

This is not the place to describe in detail the operative technique; briefly, through a suitable and sufficient incision the constricting neck is exposed and divided under direct vision, using extremely shallow cuts, so that only the thinnest layer is divided at a time. In a femoral hernia the obstructing Gimbernat's ligament may be difficult of access, and both inguinal and femoral routes should be used to obtain adequate exposure. The obstruction having been overcome, the bowel is drawn down somewhat so that the portion that has been subjected to the greatest pressure can be examined and, if necessary, oversewn. The viability of the bowel is tested in the classical manner, but it requires experience in difficult cases to determine this with certainty, the more usual error now-a-days being to resect bowel which was capable of recovery. Such resection adds considerably to the risk of the operation, and should be avoided in all cases where it is reasonably certain that recovery is possible. When the peritoneum has been closed, in suitable cases it is justifiable to attempt some sort of radical cure, but in patients who are very ill the wound is rapidly closed, with drainage down to or even into the peritoneal cavity. While it is advisable to delay action of the bowel for a little time, post-operative distension must be avoided, since it is not unknown for a hernia to strangulate a second time within a day or two due to this cause. When the patient is unable to stand the resection of gangrenous bowel, it may be fixed in the wound and drained, provided always that the obstruction is thereby overcome. The subsequent operation for resection of the extruded portion and entero-anastomosis is then performed after an interval of ten to fourteen days, and is associated with no more than the usual risks. In the case of large para-umbilical hernias the operation is always a cause for anxiety, as the patient is ill-fitted to withstand any prolonged procedure, and yet the multiple adhesions demand careful and tedious dissection. It is always a mistake in such cases to do more than is absolutely necessary to relieve the obstruction. When dealing with the rarer types of strangulation, whether or no the diagnosis has been reached beforehand, the operation must be conducted *secundum artem*, the obstruction being relieved as simply as possible. In some cases, however, e.g. diaphragmatic hernia, it will be essential to close the aperture for fear of immediate recurrence.

While strangulation of a hernia must remain a serious condition, the high mortality rate previously mentioned, which was derived from hospital statistics of a former period, can undoubtedly be reduced very considerably if these cases be treated upon commonsense lines, and the balance well held between over-conservatism and excessive zeal.

POST-OPERATIVE CHEST COMPLICATIONS AND THEIR TREATMENT

By C. J. FULLER, D.M., M.R.C.P.
Physician, Royal Devon and Exeter Hospital.

POST-OPERATIVE pulmonary complications may be divided into two main classes : the first includes the following conditions, bronchitis, broncho-pneumonia, collapse and lung abscess; the second is pulmonary embolism. Taking the first group of complications, it may be as well to describe the salient features of each. Bronchitis is one of the commonest of all and at the same time of less serious prognosis than the others. The onset occurs about the second or third day after operation and the physical signs are those of bronchitis found in general medical practice, but are usually confined to the lung bases. Bronchitis may occur alone or combined with areas of consolidation either due to broncho-pneumonia or collapse and it is probable that it has an intimate relationship to the latter condition.

Broncho-pneumonia is recognized at its onset by a rise of the temperature and of the pulse and respiration rates. The temperature rises to 102°–103° F., is irregular and falls by lysis in the course of seven to fourteen days. Cough is troublesome and at first dry, but in two or three days is accompanied by mucopurulent sputum. The physical signs, as in bronchitis, are confined to the lung bases except in unusually severe cases and consist of areas of impaired percussion together with fine crepitations, bronchial breathing and an ægophonic vocal resonance. As the condition advances, the adventitious sounds become coarser, developing into typical redux crepitations. Empyemas may develop as complications as may lung abscesses. The infecting organisms are mixed, type IV pneumococci predominating.

Closely associated with the broncho-pneumonic group are the cases of *collapse.* A well marked massive collapse of the lung is unmistakable, but the lesser degrees are easily confused with patchy pneumonic consolidation, and they both occur side by side. The onset occurs three or four days after operation and, in my experience, is always preceded by some degree of bronchial catarrh. The patient's first complaint is usually of a feeling of tightness in one or other side of the chest, and he finds that he is most comfortable lying curled towards the side affected. Physical examination shows a well marked diminution of movement on the collapsed side and sometimes it is possible to note a narrowing of the intercostal spaces. There may be a spinal curvature with the concavity towards the same side. The most striking feature is the displacement of the heart. Over the lung the percussion note is impaired or dull and the breath sounds are at first absent, later to become tubular in quality with a nasal vocal resonance. Radiographically displacement of the heart and mediastinum is well shown and the collapsed lung appears as a uniformly grey area triangular in shape with the apex at the hilum and the base on the diaphragm. This is due to the fact that the lower lobe is almost always affected and the upper border is formed by the interlobar septum. The sputum is purulent, viscid and varied in amount.

Lung abscess may be due either to the inhalation of septic material, to septic embolism, or as a complication of broncho-pneumonia. The first is the commonest cause and the second strictly belongs to my second class of complications. Lung abscess due to the inhalation of septic material is particularly liable to occur after operations on the mouth, pharynx and larynx. Evidence that an abscess is developing may not declare itself for four to six weeks after operation, the interval depending on the virulence of the organisms inhaled with the foreign material. The patient starts with a dry cough, which is paroxysmal in nature. After this has been present for a few days or possibly one to two weeks, a relatively large amount of foul-smelling pus is expectorated and the temperature which has been swinging up to 103° F. suddenly drops. If the abscess drains adequately into a bronchus, re-accumulation of pus will not occur and the abscess will heal. If, however, as is frequently the case, the abscess is in a lower lobe, it is then likely that the temperature will start to rise again as before and another quantity of pus will be coughed up. This state of affairs results in the production of a thick walled cavity which will tend to become chronic. Lung abscesses of embolic origin are typically seen following operation in cases of acute osteo-myelitis; they are multiple and more rapid in onset than in the inhalation type and there is not the prodromal stage just described.

The second class of complications, the *pulmonary embolisms*, form a special group. The most usual way they declare themselves is by infarction of the lung. The onset occurs about the tenth day after operation and the clinical picture is unmistakable. The patient is apparently making an uninterrupted recovery, when suddenly he complains of acute pleuritic pain; this is accompanied by a slight rise in temperature for two or three days and a small amount of blood stained sputum. In some cases one may hear a pleural friction over the lung, but usually there are no other physical signs. More gross pulmonary embolism is from a practical point of view beyond the scope of this article, which is primarily concerned with treatment. Cases have been reported in which clots have been removed by operation from the pulmonary artery, but they are very rare.

ETIOLOGY

Reverting to the first group of complications, a brief discussion of the predisposing causes and the part they play will help considerably in the understanding of the various forms of treatment advocated for the prevention and cure of these complications. There are three main factors involved, namely respiratory tract infection either before, during or immediately after operation, diaphragmatic inhibition and the lowering of the patient's resistance. These are given in the order of their importance. Pre-operative respiratory tract infection is in my experience frequently discovered if searched for in cases of post-operative bronchitis and broncho-pneumonia. In a series I published it was found in no less than 35 per cent. of the cases.[1] Operations on the mouth, pharynx and larynx account for a further proportion of cases. In these the infection occurs while the patient is unconscious and the cough reflex in abeyance.

The second factor, the inhibition of the diaphragm, explains the prevalance of lung complications following upper abdominal surgery. Operations on the stomach and gall-bladder involve an incision through the upper abdominal wall and any deep inspiratory effort is painful, coughing being extremely distressing, and as a result the patients who have undergone such an operation breathe almost entirely with their intercostal muscles. Keith[2] has shown that the diaphragm is in great part responsible for the expansion of the lower lobes of the lungs; it therefore follows that when the diaphgram is inhibited, whether voluntarily or involuntarily, the lower lobes suffer, and it is just in this portion of the lungs that bronchitis, broncho-pneumonia and collapse occur; the reason being that owing to the difficulty experienced by the patient in coughing and the imperfect expansion, any excessive bronchial secretion tends to accumulate and form an admirable culture medium for infecting organisms present.

A very pretty demonstration of the diminution of lung expansion was carried out by Churchill and McNeil.[3] They measured the vital capacity of patients before and after various types of abdominal operations with the following results :—

Gall-bladder operations	25	Percentage of the preoperative capacity.
Chronic appendicitis	60	
Inguinal hernia (Bassini)	50	
Non-abdominal	100	

The third factor is the lowered resistance of the patient to the infecting organisms. This may be brought about by the emergency for which the operation was performed and is exemplified by a condition, such as a perforated gastric ulcer, in which the patient is profoundly shocked before reaching the operating table. Other important factors are the age of the patient; thus the very young and old are prone to develop chest complications, as also are those who are suffering from debilitating disease, such as malignant growths.

ANÆSTHETIC

The question of the anæsthetic is a vexed one, and I have therefore not included it among the other etiological factors. There are numerous statistical surveys of the relative number of post-operative chest complications which follow various types of anæsthetic; but in the majority the figures are misleading as the anæsthetist naturally chooses the anæsthetic which, in his opinion, is safest for the patient and at the same time will give the surgeon the best possible conditions for the performance of the operation. Thus it is that a patient who has chronic bronchitis and a strangulated femoral hernia may be operated on under spinal anæsthesia and so the figures for complications after spinal anæsthesia assume large proportions. In my opinion there is no safer anæsthetic than ether; but it has been shown that both it and chloroform irritate the bronchial mucous membrane, therefore I would say that they are best avoided when there is any question of a pre-operative chest infection. Gas and oxygen are harmless in this respect and no doubt with further experience it will be found possible to use the basal anæsthetics, such as evipan, over longer periods than is now done. On the whole, however, it may be said that the anæsthetic does not play the large part it was once supposed to do.

THE RELATIONSHIP OF COLLAPSE TO OTHER PULMONARY COMPLICATIONS

It is generally admitted that the relationship of pulmonary collapse to respiratory tract infection is very close, but there is some argument as to which is primary. In my opinion it is probable that in both broncho-pneumonia and collapse there is a pre-existing bronchial infection. They should be regarded as two variants resulting from a common cause. If the catarrhal exudate contains organisms of sufficient virulence, broncho-pneumonia will result although there may co-exist with it patchy areas of collapse. If on the other hand the catarrhal exudate does not contain organisms of sufficient virulence to produce broncho-pneumonia and the respiratory movements are insufficient to dislodge the secretions, collapse will be the feature of the case, the degree depending entirely on the viscosity of the sputum and the size of the bronchus obstructed. In other words, airless lung will result in either event, in pneumonia the alveoli being filled by fibrinous exudate, and in collapse the air being absorbed behind the obstruction and the alveolar walls coming together cause a shrinkage of the lung volume and a displacement of the mediastinum towards the affected side.

TREATMENT

The treatment of post-operative pulmonary complications naturally falls into two phases: (1) prophylactic; (2) curative.

The *broncho-pneumonia collapse group* having a similar etiology may be considered together from a prophylactic standpoint. Taking into account the important part played by respiratory tract infections it is reasonable to stress the care with which these should be searched for before subjecting the patient to operation. It is generally admitted by surgeons that there is a much higher proportion of chest complications among patients treated in hospital as compared with those in private, and it at once seems probable that this may be due to the fact that the hospital patient has, unless suffering from obvious bronchitis, to be operated on when there is a vacancy in the hospital and that perhaps sufficient attention to the minor infections of the upper respiratory tract, such as colds, is not given. In a certain class of emergency operation it is clear that considerations of this sort must be ignored as it is a question of saving life, but nevertheless the importance of this point should be more widely recognized. In operations, no matter how trivial, on the mouth, pharynx and larynx, the greatest care must be taken to avoid the inhalation of infected blood-clot, pus and foreign bodies. The incision of such a simple condition as a peritonsillar abscess is fraught with danger.

The adequate expansion of the lower lobes of the lungs is perhaps the field in which most progress has been made in recent years. This may be done in two ways, first by the voluntary efforts of the patient, and secondly by the application of the fact that CO_2 stimulates the respiratory centre. Considerable difficulty will be experienced in persuading some patients who have had an upper abdominal incision to breathe as deeply as they should and to cough if they feel that there is any sputum present in their bronchi, but nevertheless the importance of so doing should be impressed on them by the surgeon and nursing staff. CO_2 provides a means of producing deep respirations in spite of what the patient may want to do. The personal factor, however, must be kept in mind and I have found it a good plan to explain to patients before operation that the appearance of someone with a gas mask and a cylinder does not necessarily mean that they are to be called on to undergo further operations. The most effective time to administer CO_2 is before the patient has regained consciousness from the anæsthetic; there is then no personal factor to deal with and the advantages are twofold, for the lungs are not only completely expanded but also any residual anæsthetic is rapidly removed. It should be a practice for all patients who have had upper abdominal operations to be given a few minutes before leaving the theatre. The strength of CO_2 given varies in different places, 10 per cent. in oxygen being a useful proportion. It can be given through the apparatus used for administering nitrous oxide. Later when consciousness is regained it is advisable to give further doses for three-minute periods three or four times a day to patients who are in any way likely to develop pulmonary complications.

It is perhaps platitudinous to say that the patient should be placed in the best possible condition to resist post-operative complications. There are no universal rules to adhere to, but there is a wider use for blood transfusions than is generally recognized. Other adjuvants, such as adrenaline, strychnine and warmth, are of course in everyday use. Morphine apart from the trouble it causes by abdominal distension has another disadvantage in abolishing the cough reflex and making respirations shallow.

Once broncho-pneumonia has developed treatment follows the usual lines. Digitalis has a definite place and 10 minims of the tincture given three times a day is an average dose. Expectorants are particularly helpful. Brandy in tablespoonful doses every four hours should be given, provided that the operation is one that does not involve the upper alimentary tract. Oxygen given intra-nasally through a No. 7 soft rubber catheter is also of great value, provided that it is given continuously. There are always a certain number of patients who, although they recover from the immediate danger of broncho-pneumonia, do not clear up as they should, and they drift into a chronic state of delayed resolution with possibly the early beginnings of bronchiectasis. I have found that the surest way to promote their recovery is to put them out in the open air on a balcony or some such place; the post-operative chronic chest differs in no way from the others of that nature and the improvement is remarkable. In addition to open-air treatment I have used vitamin A with apparent benefit in these cases.

In *massive collapse* efforts to re-expand the lung by CO_2 inhalations are sometimes successful. In others the mucus plug may be loosened by rolling the patient from side to side. Obstinate cases may call for the use of the bronchoscope to aspirate the affected bronchus. I do not recommend this for general use as bronchoscopy is essentially the province of the expert and personally I never had to invoke its aid.

The treatment of *lung abscess* presents a different problem. A lung abscess commonly remains undiagnosed until it has ruptured into a bronchus, although its presence may have been suspected. An X-ray will usually settle the matter by showing the characteristic circular shadow which before rupture is of uniform density but afterwards shows a fluid level.

Once rupture has occurred the course depends mainly on the provision of adequate drainage. If the abscess is in an upper lobe, drainage will occur naturally with the patient sitting propped up in bed. If, however, the abscess is in the lung base as frequently happens, then postural drainage must be given a trial; this alone may be successful; but it is often necessary to use bronchoscopic aspiration in addition. If after six weeks there appears to be no marked diminution in the size of the abscess cavity, surgical aid must be sought.

Finally, the treatment of *pulmonary embolism* is essentially prophylactic, for when embolism has occurred there is not any special treatment up to the present which can have a wide application. The pelvic basin and site of operation are probably the two main areas where venous thrombosis occurs, and the chief weapon in preventing this occurrence is by increasing the blood flow through the parts. This can most simply be done by movement and exercises, and every patient from the first should therefore be made to do leg exercises each day and should be allowed to do simple things for himself.

Thus it is that whatever type of lung complication one hopes to prevent, early movement of the lungs and the rest of the body will do more towards ensuring a rapid and uneventful convalescence than any other measure available. The patient who lies immobile in bed hardly daring to raise a hand will fall a victim to the complications he dreads.

References

[1] Fuller, C. J.: *Lancet*, 1930, i, 115.

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ATHLETIC AND TRAINING DIETETICS.

By ADOLPHE ABRAHAMS, O.B.E., M.D., F.R.C.P.

Physician to Out-Patients, Westminster Hospital; Physician, Hampstead General Hospital; Honorary Medical Officer to the International Athletic Board and British Olympic Athletic Team.

A PROPER conception of the diet suitable to the athlete must be based upon a survey of the body's requirements under ordinary conditions and the changes to be made to meet the exceptional conditions comprised under violent exercise and training. The fundamentals are readily comprehended, for they are based upon a multiple of physiological experiments and investigations which, allowing for idiosyncrasies and for the adaptability of the human organism, enable us to state with certainty the average requirements. The modifications imposed by exercise present a very different problem. Diet in training has from the earliest days received more than its proper share of importance. It has been credited with attributes and possibilities always exaggerated and generally imaginary. Articles of food are vaunted and recommended as "good or bad for training," as "good or bad for the wind." And although most of the outrageously unphysiological precepts of old-time training have largely given place to more modern common-sense principles, a few traditions remain, as if something must be retained amid the shifting quicksands. A comparatively recent manual of training includes such absurd recommendations as "food to generate staying power, nerve force and energy, for the jumper; foodstuffs to impart endurance, for the distance runner; and articles of diet and liquids which particularly make flesh and blood, for the hammer-thrower." The choice and selection of such materials, be it noted, were left entirely to the reader!

In general, it may be stated that the outstanding misconceptions that will with difficulty be eradicated are that certain articles of food possess specific properties to increase respiratory power or circulatory efficiency; that energy, stamina, strength and endurance are directly obtainable from concentrated comestibles; and that liquids must be restricted as far as possible and only the barest minimum consistent with existence, certainly less than that consistent with comfort, should be permitted.

Food contributes to the transformation of a non-athletic into an athletic body only in providing a source of energy, and it is at once evident that any food which is a source of energy will be "good for training." The food must be easily digested. While a certain amount of indigestible residue is necessary for health, a large mass of indigestible and undigested material demands in its manipulation the diversion of energy from a useful to a wasteful purpose. Since during exercise so much energy is required for the muscular effort, only a minimum ought to be demanded from the digestive organs. Nor should the heart and lungs be embarrassed by the abdominal distension consequent upon improper or injudicious food and feeding, since abdominal distension by pushing the diaphragm upwards may not only impede respiration, but can cause cardiac embarrassment, with symptoms which the inexperienced will mistake for serious heart disease. From such elementary considerations proceeds the reason for avoiding certain articles of diet and excess of fluid at inappropriate times, but an original truth has become perverted into a misinterpretation and a misapplication. In an anxiety to avoid the wrong path, our predecessors wandered from the right. Appreciating that over-cooking hardened the fibres of meat they went to the opposite extreme and ate it nearly raw. The elimination from the menu of everything that was not superficially digestible meant the eradication of nearly everything palatable. Such injunctions and prohibitions led to a monotonous and distasteful, even nauseating, régime which invited staleness, boils and other minor illnesses only too frequent during the training of the past and, although rare, not altogether absent at the present day.

THE QUANTITY OF FOOD

In respect to the quantity of food which an athlete should consume, it might be thought that any injunctions or recommendations were superfluous; that in this, as in all activities, the only guide was the natural appetite. And yet to this day some residue remains of the original impression that a man achieves by what he eats, not by what he does. Admittedly the day is long past when it was supposed that the whole art and secret of training was, to use an accepted phrase, "to stuff as much beef and mutton as possible and then go on to the water to work it into the system." I preserve a gruesome recollection of the preposterous "training breakfasts" of my Cambridge days and the inevitable dyspepsia and ultimate staleness which followed upon those unphysiological perpetrations. To eat beyond the requirement of the natural appetite is a gross error, for every particle of food so eaten becomes an encumbrance, a hindrance and a loss. We know that for men to eat enormous meals and then to exercise in order "to work it into them" is to reverse the order in which the natural requirements of the body are supplied. If exercise creates appetite and hunger, the natural instincts may be taken as a guide. But deliberately to consume large quantities of food, especially of animal proteins, on the mistaken idea that strength is automatically acquired is an error which happily is becoming more and more universally recognized. I have been particularly impressed by the astonishingly small food intake of the long distance racing cyclists, astonishingly small having regard to the enormous physical output. This is surely an endorsement of the impression that eating is often a matter of habit and not a true representation of the need for food. The long distance cyclist is in general of an unemotional placid type, independent of the stimulation which the more highly strung athlete seems to require. There is the alternative explanation that his metabolism may be exceptional and that he is capable of extracting the nutritious essentials to a greater extent than the majority or of utilizing them more efficiently, a view which I feel sure the physiologists would not accept.

That protein has a special function in athleticism seems to be too well supported by experience to be doubted, and the advantage of animal foodstuffs appears to rest upon a solid foundation. Of more recent date the virtues of carbohydrates have become exalted into a sort of reverence and the practice of taking sugar a short time before a contest is at least harmless, even if all that is claimed for it cannot be accepted. The fuel for muscular activity is obtained from the food built up into the tissues and providing a storehouse from which supplies are drawn on demand, but it is at least possible that the readily absorbed and readily utilizable carbohydrate may be directly and immediately available for emergencies. When very long distance efforts such as a Marathon race and road racing cycling are concerned, the administration of small quantities of sugar at regular intervals may well be contemplated, especially as certain investigations in America appeared to correlate exhaustion in Marathon runners with hypoglycæmia, a correlation which in my experience is not so obvious as the American results have implied. It is doubtful if in the course of even so protracted and severe an effort as a 26½ miles run, the stores are depleted, and in this country, at any rate, it is not the practice of Marathon runners to take anything at all during the race. It is not easy to separate the advantage of the mere stimulation of swallowing something from the possible replenishment of deficient resources, and the difficulty of ingestion during such an exercise and the risk of stitch consequent upon visceral distension are important objections. In the case of such efforts as a 100 miles run and very long distance cycling—six or twelve hours or longer—food must be supplied and the men themselves vary considerably in their choice.

Most experienced athletes learn that the nervousness which is almost inevitable before a contest demands extra precaution in the matter of feeding. During his training each man will usually find for himself the most suitable food antecedent to exercise; when an actual race is in question it is well to err on the side of eating too little. The ideas which some trainers exhibit on this subject are ludicrous. Some advise a large quantity of soup because this is " light and sustaining," with the result that the stomach becomes burdened with a lot of useless fluid which, at its best, does no good, and at its worst leads to serious discomfort. Others insist on a generously large steak or several chops and beer or stout, supposing that energy can be supplied by such food taken a short time beforehand. Others, again, go to the other extreme and recommend a number of raw eggs, or even only apples and oranges. It may be stated dogmatically that the final meal before a race is dictated by the experience of the kind and quantity of food that have been found to permit of extreme exertion with the maximum of comfort. Individual requirements vary enormously and it is folly to dictate any more general policy than that whatever is preferred should be taken at least two hours before the race is due. If a number of events are contested during an afternoon, a small cup of hot tea with three or four lumps of sugar may with advantage be taken half an hour before the final effort.

VEGETARIANISM

That man is adapted to a mixed diet is indicated by the length of his alimentary canal — intermediate between the comparative shortness of the carnivora and the comparative length of the herbivora. On occasion, a so-called vegetarian becomes distinguished in the world of sport to a degree which encourages admirers to suppose there may be some special advantage in his dietetic heterodoxy. But it is just as well to remember that " vegetarianism " usually permits of the inclusion of milk, eggs, and cheese, which are just as animal as chops and steaks, and in practice the only difference instituted is abstinence from meat. If purely vegetable foods alone are taken it may be stated that without exception of any kind the alimentary canal of man is incapable of manipulating sufficient to ensure the adequate calorie value.

G. M. Wishart[1] has recently published some experiments upon a " vegetarian " cyclist. In these the output of energy was measured when varying diets were administered under the strictest scientific precautions. It was found that the best performance during hard muscular exercise was obtained on a high calorie diet rich in animal protein. A diet of high protein value but exclusively of vegetable origin had to be abandoned owing to the extreme flatulence produced. Not only so, but even allowing for the shorter duration of that particular experiment, the performance was inferior. The day's allowance when the optimum output was obtained consisted of: five pints of milk, eight eggs, 5⅓ oz. of " Emprote," one pint of grape juice, six oz. of wholemeal bread, 1 oz. of butter, 5⅓ oz. corn flakes, three tomatoes, one pear, and one orange. The protein in this amounted to 228 grams, the total calorie value was 5,007.

The non-meat eating athlete is a rarity; it would seem that for the large majority, muscular efficiency is best ensured by the proteins of meat. When the vegetarian athlete or strong man is quoted as an instance of the advantage of the cult, it would be as foolish to deny that this sort of diet may be the most suitable for his particular machinery or to assert that he would perform still better on an average mixed diet including meat, as to insist that all athletes would be wise to follow his example.

VITAMINS

When a sensible average dietary is accepted it is difficult to exclude a sufficiency of all the recognized vitamins. But I am sometimes tempted to believe that some vitamins may play a special part in athletic efficiency and that a generous supply should be deliberately cultivated. Some laboratory experiments have tended to support this impression. Certainly the craving for butter which is by no means unusual during training and which was reprobated as morbid and vicious by the old-time trainers may mark the instinctive attempt of the athlete to secure what is in his special circumstances a necessity, quite apart from the high calorie value of fat; though so far as the experiments appeared to show, the vitamin which seemed to enhance efficiency was vitamin B.

LIQUID

What is the foundation for the idea that during athletic training liquid should be drastically restricted? How did the idea originate to deny the natural demand of the body for fluid? How has this idea been perpetuated and what benefit is a man supposed to derive from it and the misery he suffers? I believe it may be traced to the days of perhaps a hundred years ago when strenuous and competitive athletics—rowing, boxing, running—were the prerogative of the professional, in whom restriction of his ordinary habits of intemperance and gross over-feeding was the most important rule that could be framed and enforced. When athletics became fashionable, the young bloods of the period naturally imitated the methods of the professional, more especially since, at the time of which I am writing, comparison in regard to the habit of drinking was probably unflattering to the amateur ! But now-a-days the man who may be described as chronically intemperate does not aspire to athletic distinction, or if he undertakes a course of training very speedily abandons it. Yet although the necessity to restrict liquid (i.e. alcohol) has disappeared, the idea that liquid is in some way " bad for training " to some extent persists. Such a prejudice may be responsible for some of the breakdowns which occasionally occur during training. Violent exercise is necessarily accompanied by a considerable loss of fluid from the body *via* the lungs and skin, e.g. during a Marathon race a weight of six pounds and even more may be lost. If such a loss is not replaced regularly and adequately the athlete's machinery becomes very like that of an insufficiently lubricated engine with a tendency to " seize."

We may pass from an assertion that liquid is not harmful to a declaration that a liberal quantity is actually beneficial. Such a quantity, it must be submitted, should not be ingested at meal times so that distension may be avoided. But water or, at least a very bland liquid, judiciously taken at intervals will not only obviate the unnecessary suffering of thirst, but will lead to greater efficiency. Enough should be permitted to make a meal enjoyable, larger quantities may be taken when the stomach is empty; on rising, between meals, and on retiring.

ALCOHOL

Alcohol is quite unnecessary to the athlete, and the advice sometimes given to regard it as a " tonic " during training may be deprecated. It is amusing to recall that the old-time trainers prescribed for a runner in training two glasses of wine in the evening, and for boxers the same quantity, but the former was given sherry and the latter port! Alcohol has its place as a medicine rather than as a routine feature. In everyday life alcohol is often taken to enable a tired, overworked man to eat his dinner; the healthy athlete, with the stimulus of fresh air and exercise, needs no such assistance. A man accustomed to the beverage may be allowed half a pint of beer at lunch or dinner. It is the practice during the full training of the University crews to allow an occasional half-bottle of champagne, which has the reputation of a special function. At least it serves its purpose by instilling a spirit of cheerfulness to mitigate the over-anxiety only too prevalent in such circumstances.

SMOKING

Tobacco is not a food save in the hyperbolic sense, but smoking is so closely associated with eating that its consideration here is not inappropriate. An embargo upon tobacco is the last link with traditional training, and smoking is still popularly held to be "bad for the wind." Yet it is not easy to point to any associated evil of considerable consequence. Control experiments are almost unobtainable, comparison of the capabilities of smokers and non-smokers is unconvincing because the majority of athletes are smokers, although I observe an increasing tendency in the modern young man to abstain, possibly as a reaction against feminine participation.

It has been claimed, though I do not know upon how good an authority, that the average resting pulse rate is seven beats per minute faster as a result of smoking and that return of the accelerated rate after exercise to normal is delayed, which would suggest that the heart of the smoker is less efficient in time of stress. The ability of the blood to transport oxygen is decreased by the presence of carbon monoxide in inhaled smoke. And it is possible that the effect on the nervous system of blunting the appreciation of stimulation and paralysing or retarding impulses would be shown in delay in getting off the mark.

All of this if correct would indicate that smoking has a distinct disadvantage to the athlete, but it is difficult to assess the extent of this disadvantage and to decide whether its removal will counterbalance the disturbance which abstinence sometimes produces in the established addict.

Perhaps the young athlete should be encouraged to abstain not only because tobacco will have a relatively greater effect upon him, but because the habit cannot have become so deeply ingrained that deprivation is serious. Older men and confirmed smokers must decide for themselves whether or no they lose more from the insomnia, restlessness and other ill-effects which may follow self-denial than they gain by an increased physical efficiency which it is difficult to estimate. In my experience many of the greatest track athletes smoke up to the very last moment of going to the mark. Oarsmen, of course, cannot be so self-indulgent, for with them training must be a corporate affair, personal responsibility alone is not concerned, and they are in honour bound to abstain.

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NON-SPECIFIC COLITIS

By D. C. HARE, C.B.E., M.D., M.R.C.P.
Physician, Royal Free Hospital, and the Elizabeth Garrett Anderson Hospital.

NON-SPECIFIC colitis is a general term for a well-recognized clinical condition characterized by discharges of blood and mucus with or without diarrhœa; descriptive adjectives, such as " hæmorrhagic " or " ulcerative," are commonly used, but these should be discarded, as they refer to single aspects of the disease in which the prominent symptoms and signs vary widely. The etiology is unknown in spite of intensive study, and it is almost certain that there are multiple factors, but in the present state of ignorance the title " non-specific " colitis appears to be the most suitable. The condition known as " mucous " colitis is excluded from this survey, as there is a general opinion that it belongs to a different category.

The outstanding *pathological change* in the bowel is an inflammation of the mucous and submucous coats, sharply limited to the large intestine; the descending colon is commonly affected, the pelvic colon suffering most; isolated sections of the proximal parts may be involved and in particular the cæcum. The mucosa is velvety or granular, owing to œdema and intense congestion, and weeps blood from the apparently unbroken surface. Ulceration is caused when the intense inflammation leads to necrosis and sloughing; the ulcers may be minute and partly concealed by the surrounding œdematous tissue, or so extensive that the bowel is lined by granulation tissue alone; prolific regeneration of the intervening epithelium may occur, and causes the polyposis seen in chronic cases. The muscular coat is profoundly altered, as it is invaded from within outwards by the inflammatory process and œdema; the affected portion becomes contracted both in diameter and length, in part due to spasm, in part to structural changes, and the haustrations disappear; it may be very friable, Hern (1931)[7] mentions two cases in which the appendix broke off in the surgeon's hand when attempting appendicostomy; spontaneous perforation is not infrequent in the acute stage. In the chronic condition fibrosis may lead to the development of a straight and rigid tube, in such a colon the normal functions of fluid absorption with dehydration of fæces will be completely lost and an incurable diarrhœa will result, while the denuded granulating surface acts as a focus of chronic sepsis.

ETIOLOGY

Clinical studies have been made of the sex, age, social condition, occupation of the patients, of family infections, personal histories of preceding illness, dietetic habits in childhood and adult life, bowel habits and use of aperients; of special interest are the immediate "causes" of first attacks and relapses and the response to special lines of treatment. The laboratory studies made by many observers have included the bacteriology and protozoology, the serology and post-mortem pathology. Some of the more important facts which emerge from these inquiries will be summarily stated. Females are more liable than males, the highest incidence of the disease is in the second, third and fourth decades, there is no family incidence, very severe cases are found among young adolescents in comfortable circumstances, whose previous health has been good. The diet has rarely been defective before the onset; the majority of patients seem to have had a good average diet according to the standards in this country, and in some the previous diet has been exceptionally good. The bowels may have been normal before the illness and aperients never taken, but histories of neglected constipation in childhood or of an habitual tendency to loose actions have been given. An immediate " cause " of an attack, as recognized by the patient, is often lacking, though a history of a previous throat or nose infection is not infrequent. Bargen and Banks (1934)[2] found that 57 per cent. of 276 relapses were attributed to infections of the upper respiratory tract and 12 per cent. to gastro-intestinal conditions. In cases personally questioned, attacks have been associated with tonsillitis, quinsy, mumps, influenza, gastric influenza, sea bathing, pregnancy, acute or chronic constipation, " slimming " diet, dietary indiscretions, especially excess of such fruits as raspberries, plums, tomatoes, cucumber. In women slight relapses may be related to the menstrual periods.

No specific organisms have been isolated which have been generally recognized as causally related to colitis, nor have the therapeutic results of treatment with special sera produced such a certain response as to establish conviction of a specific action related to a specific cause. Bargen found a diplo-streptococcus in a high proportion of his colitis cases from which an antibacterial serum has been prepared; the specificity of this organism is not widely admitted, but by the use of the serum and vaccines, together with general measures of diet treatment, the recovery rate of Bargen's large series of cases has greatly improved in the last few years (Bargen and Buie, 1934)[3], but no rapid " cure " is claimed, such as follows the uses of a specific remedy.

Anti-dysenteric serum in very large doses was first advocated by Hurst (1921)[8], its action is probably in the nature of protein shock; improvement follows in about 50 per cent. of cases treated (Hern, 1931)[7] and may be striking, but it may succeed once and fail in a second attack in the same individual and even may make the patient definitely worse.

The excretory functions of the colon are important, and that it is highly selective as regards drugs, such as iron and bismuth, is demonstrated by experiment; colitis develops in many septicæmic and infectious conditions, but whether this is due to the excretion of toxins or to the direct action of the organism is still unproved, non-specific colitis may well be the result of attack by one or other of these agents on a colon of low resistance.

Some features of colitis suggest an association with deficiency disorders; though there is not any evidence that it is the result of a gross deficiency in the diet among people of western civilization, the possibility that it is a manifestation of a latent deficiency, either inborn or acquired, must be kept in view; it resembles certain known deficiency diseases in its spontaneous remissions and relapses, the first attacks often slight and each relapse more severe than the last. Vitamin deficiency experiments in monkeys (McCarrison, 1921)[10] have produced clinical and pathological colitis closely resembling the disease in human subjects, and it is known that both vitamin A and B complex are necessary for the development of healthy mucous membranes and for maintaining their resistance to infections.

Evidence of a vitamin deficiency as a cause of colitis has been sought by making therapeutic tests of one or other of the vitamin concentrates, A and B. In a small series of acute cases, no specific response or immediate influence on the course of the disease has been noted, and chronic cases taking vitamin A and B concentrates have not been completely protected from relapses. There is no doubt, however, of the improvement in subacute and chronic cases following a high vitamin diet; the danger of vitamin starvation in chronic cases is considerable as patients tend to adopt a limited diet, mainly carbohydrate.

Clinical and therapeutic tests have been made on the relationship of colitis to gastric secretion and the hæmatopoietic factors; it is found that achlorhydria is only exceptionally present and there does not seem to be any connection between the presence or absence of gastric secretion and the severity of the colitis symptoms. A therapeutic test has been made by treating acute cases with liver extracts intramuscularly or by the mouth in very large doses, but no immediate improvement has followed except in one case reported more fully elsewhere (Hare, 1934)[5]. This patient had a profound anæmia approaching the macrocytic type, with hæmoglobin 24 per cent., red cells 1,250,000 per c.mm., and colour index 0·9; treatment with liver extract by mouth in doses equivalent to 1½ lbs. daily produced a dramatic "cure"; the gastric secretion in this patient was normal. No other case of colitis with this type of anæmia has been met with; anæmia of the microcytic hypochromic type is not infrequent, but improvement does not follow liver treatment without the addition of iron. The anæmia is often out of all proportion to the degree of hæmorrhage, the iron deficiency may be due in part to the hurry and failure of absorption in the intestine and in part to the chronic toxæmia; it does not appear to have any causal relation to the original attack, as many patients have no anæmia at the onset and treatment with iron in massive doses during the acute attack is without specific effect and does not even arrest the development of the anæmia. In chronic colitis severe hypochromic microcytic anæmia may develop and persist for years, and has been found associated with the symptoms of sore tongue, cracks at the angles of the mouth, dysphagia and achlorhydria (Plummer-Vinson syndrome); this condition responds to treatment with iron in massive doses with striking improvement in both the general health and in the bowel symptoms.

CLINICAL SYMPTOMS

The clinical picture is that of a persistent disorder; the onset is often insidious with minor symptoms followed by apparent recovery preceding a major attack by a few weeks or months and then alternating remissions and relapses over a period of very many years. The pathological condition explains many of the symptoms. In the acute attack the irritable spastic muscle causes the diarrhœa and the colicky pains which so often precede the passage of a motion and are generally felt over the descending colon; during a remission spastic constipation is frequent and may be specially severe for a few weeks or days before a relapse, or a tendency to diarrhœa may continue and is readily aggravated by exertion or excitement. Flatulent colic and the uncontrolled passage of flatus and an uneasiness of the bowel are common. Diarrhœa is the main symptom of the acute attack, but constipation, flatulence and colic are the persistent reminders during the remission.

The stools and the amount of blood they contain vary according to the extent and stage of the disease and also from day to day; repeated inspection is essential for diagnosis and the control of treatment. Blood may pour away as from a tap, such hæmorrhage often comes on suddenly and by patient and doctor is attributed to piles or to a bleeding polyp, especially as it may be associated with constipation. In the acute diarrhœal attack there are frequent fluid stools up to eight or ten daily resembling dysenteric discharges with mucus, blood and pus; but the last may not be obvious on inspection. The mucus is sometimes transparent and sometimes in opaque flakes, such as may be seen adhering to the surface of the mucosa on inspection through the sigmoidoscope. Unformed offensive fæcal stools with little blood have been passed continuously in chronic cases; the unexpected passage of a well-formed fæcal motion shows that part of the colon is unaffected and is functioning normally. During convalescence and, after all symptoms .have abated, tell-tale streaks and tiny flecks of blood may be seen on the solid fæces from time to time, bearing evidence that the mucosa is still in the hyperæmic condition and sensitive to the slightest friction.

Other symptoms in the acute attack are those of general toxæmia, irregular fever, with a rise to 100° or 101° F., nausea and vomiting; a pulse rate of 120 or more is a grave prognostic; anæmia is progressive and may become severe, accompanying it massive œdema may develop; phlebitis and urinary infections may complicate the already desperate condition, but however ill the patient, ultimate recovery may follow.

DIFFERENTIAL DIAGNOSIS

Diagnosis may often be made with some certainty on the history, especially when slight transitory symptoms have preceded the main attack. The general examination must include a digital rectal examination and repeated inspection of the stools; laboratory investigations are essential and examination by an expert of a fresh stool, while still warm, is necessary to exclude an active amœbic infection. In the acute case these investigations will usually suffice for a diagnosis and further local examinations should be postponed. In a chronic case without a typical history, a barium enema and X-ray is required to exclude a growth of the colon, instrumental examination by the proctoscope or sigmoidoscope may also be necessary, but should not be regarded as a routine procedure in suspected colitis. It should never be forgotten that the hyperæmic mucosa of colitis is intensely sensitive and that slight trauma in preparation of the bowel by enemas and in passing the instrument is unavoidable; the examination nearly always increases the symptoms and may even initiate a fatal relapse. In the convalescent and chronic case the mucosa is less susceptible to injury and local inspection may be made at intervals to determine the degree of recovery and response to treatment. X-ray examinations are also of value in prognosis and will show when the irritability of the muscle has subsided. Detailed studies of X-ray appearances have been made by Knothe,[9] Barclay,[1] and Berg.[4]

TREATMENT

The treatment of colitis often brings despair to the practitioner, but if he is unable to do good, at least let him be sure that he does no harm to his patient. *Colon lavage* has in the past been employed almost universally, yet it is certain that this form of treatment may do infinite harm; it is especially injurious in the presence of fever and a rapid pulse, but even in the less acute case it keeps up the diarrhœa and tendency to bleeding by daily irritation of the hypersensitive mucosa and spastic muscle; the patient usually dreads the injection on account of the pain. The unreliable results and failure of lavage to prevent relapse are generally acknowledged; some patients do recover while undergoing lavage treatment, but this is no proof of curative action. Many disinfecting drugs have been used in irrigation, the least harmful fluid is normal saline. Medication of the lower bowel with yatren or bismuth subgallate in a small volume of fluid, as recommended in amœbic dysentery, has been tried for colitis but with variable and sometimes bad results.

Surgery should not have any place in the treatment of acute colitis; appendicostomy and cæcostomy are practised to provide for more thorough irrigation, but the method is unsound in principle; stomata that allow the escape of the fæces and divert them from the affected part are more rational but the mortality is high even in so simple an operation. Good results are reported after ileostomy in extensive colitis, but owing to the discomfort of a stoma in this position, patients ask for it to be closed sooner or later, and this operation or an anastomosis of the ileum and pelvic colon is almost invariably followed by a severe relapse and is often fatal, even when closure is postponed for several years after apparent recovery from colitis symptoms. Even after ileostomy there may be continued ill-health on account of septic absorption from an unhealed colon; complete extirpation of the colon is an heroic operation, but if the patient survives he may make a marvellous recovery. Operation may be required for perforation of the colon, but the outlook is almost hopeless as the powers of tissue repair are very low and there may be more than one perforation. The patient with colitis is a bad surgical risk.

Dietetic treatment.—The patient in the throes of an acute attack is disinclined for food; nausea and vomiting, when present, are serious complications and are best combated by small feeds of two or three ounces given every hour. A fluid, low residue diet is given, which may include citrated milk, eggs raw or lightly cooked, orange juice, glucose lemonade, rusks, toast and butter, dried milk preparations, Benger's food and arrowroot. It is often stated that milk is not well tolerated, but this is unusual. When the first acute symptoms are abating soft solids can be added, such as fish, creamed chicken and potato purée, but it is often a real problem to satisfy the patient's returning appetite and to improve his nutrition without increasing the diarrhœa and abdominal pain; on the whole it is better to err on the side of generosity in the diet when the patient is hungry; the principle of frequent small meals should be adhered to, as hunger increases the activity of the gastro-colic reflex and causes the distressing association of an action of the bowels with the taking of food. After further improvement minced steak and mutton, sieved green vegetables, especially spinach, baked apples, tomato juice, pulped raw dessert apples, green-leaf salads are gradually added;

bread, biscuit and other starchy foods should be restricted. In full convalescence the diet may include in addition to the above, eggs, two or three daily; milk, 20 to 30 oz.; butter, 2 oz.; cheddar cheese, cream cheese; meat and fish, twice a day. Written instructions on diet should be given to the patient with a list of what to avoid; this includes nuts, dried fruits, jams with seeds, marmalade with peel, small fruits, such as raspberries, strawberries and currants, dried peas, beans and lentils, onions and onion flavourings, ices and iced drinks, wines, beer and spirits. Patients are cautioned never to eat a heavy meal and to take a very light small meal when specially fatigued or when suffering from chill, cold or sore throat; to go to bed on fluid diet on return of abdominal colic or bleeding, as these are more significant of a threatened relapse than a slight diarrhœa.

Vitamin prescription.—Vitamins in concentrated form are given from the first; vitamin A as a concentrate, or halibut-liver oil containing vitamins A and D, vitamin C as orange juice or tomato juice 4 oz. daily, vitamin B complex as yeast powder or other commercial preparation. Vitamin D concentrates have been avoided as there is not any indication for its use and over-dosage is possible. The vitamin and iron content of the diet outlined above for convalescence would be sufficient for maintaining ordinary health; but in colitis, even when a full diet can be taken, it appears desirable to prescribe supplementary sources of vitamins. Patients left to their own inclinations usually adopt a very faulty regime with excess of carbohydrates. A group of chronic patients, who previously were not under any supervision, are now being given a revised diet with supplementary vitamins, and the improvement in weight, in well being and in working capacity is very definite. Iron has been given to subacute and chronic cases with benefit, even when anæmia is slight; in chronic cases when anæmia is severe, iron treatment produces rapid improvement in general health and in the symptoms of colitis. Iron and ammonium citrate, grains 90 daily, or Blaud's pill in capsules of 25 grains each in a daily dose of 100 to 150 grains have been equally efficacious.

Raw apple diet has been advocated for the treatment of diarrhœa of very varied origins and symptomatic improvement follows in some cases (Hartwich, 1933).[6] From one to three pounds of finely pulped ripe apple is given daily for 24 to 48 hours in small servings at two-hourly intervals, no other food is allowed, one to two pints of water or weak lemon tea are given to drink. On the following day the diet is restricted, and then the previous diet is resumed. So far only a few observations on this treatment have been made by the writer; two subacute patients with subacute symptoms experienced considerable relief of diarrhœa and were very pleased with their improvement, one acute case became definitely worse, other results were indefinite.

General care of the colitis patient.—Recognition of the disorder in the early stages, better management and continuous care should lead to fewer fatalities, less invalidism, and a better prognosis. Patients need moral support during the long course of this depressing condition. At each visit the diet should be scrutinized and the patient weighed; the patient who is underweight is not cured and when losing weight is in danger of a relapse; abdominal discomfort, flatulent colic, constipation, lack of appetite are all danger signs as well as the more obvious symptoms of diarrhœa with offensive motions and blood streaks. Constipation is best treated by liquid paraffin; atropine by mouth, grains 1/300th once or twice daily helps to relieve spasm and colicky pains. When there is a constant tendency to diarrhœa, increased on exertion or excitement, patients find it almost impossible to leave the house; in these cases an opium mixture may be prescribed for use on special occasions.

SUMMARY

Non-specific colitis is a disease of long duration with alternating relapses and remissions. The causation is still unknown. Certain features link this disorder to the vitamin deficiencies and the anæmias. Clinical manifestations are more varied than is generally recognized. Diagnostic investigation should include an X-ray examination by barium enema, other local manipulations, such as sigmoidoscopy, are not without danger and should not be used as a routine. Treatment by colon irrigation is irrational, harmful, and should be abandoned. Surgical procedures should be avoided as the patients are bad surgical risks; operations for closure of artificial stomata lead to relapse which is often fatal. Treatment by high vitamin diets are very beneficial, and iron gives remarkably good results in anæmic cases. Early diagnosis, proper management and continuous care of the patients improve the prognosis.

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CANCER OF THE NASAL ACCESSARY SINUSES: WITH REPORTS OF 13 CASES

BY E. WATSON-WILLIAMS, *M.C.*, CH.M., F.R.C.S.

Surgeon-in-charge, Ear, Nose and Throat Department, Bristol Royal Infirmary; Laryngologist, Bristol and South-west National Radium Centre.

MALIGNANT disease of the nasal sinuses is not very common. Moreover, despite the fact that a diagnosis is generally possible before dissemination has taken place, it has an evil reputation as regards the results of treatment. For these reasons, although obviously the periods of observation are too short to claim permanent " cures," there is some interest in the following series of thirteen cases which have come under my care during the past five years.

Incidence.—As the annexed table shows, five of the patients were males, eight females; in large series males slightly predominate. The condition tends to affect rather elderly persons; when symptoms were first noticed four of the patients were over seventy, and only two under fifty-seven years of age.

Etiology.—Three patients showed evidence of chronic sinusitis. One of these, and two others, ascribed the onset of the present trouble to influenza. Although neither sinusitis nor influenza is rare, these histories may indicate some etiological significance. It has been stated that malignant change in a " mucous " polypus is not infrequent; in my own experience of many hundred cases of mucous polypus I have never encountered this phenomenon (unless Case 2 is an example).

Symptoms.—The situation rather than the histological type of the growth determines these; and it is convenient to consider (*a*) cases in which the ethmoid is involved, with or without the antrum—probably in many cases the ethmoid is the starting point, and (*b*) cases in which the antrum is involved but the ethmoid free. In the series now reported, the ethmoid was involved in six cases; in every "ethmoid" case the complaint was of nasal obstruction and discharge, the former from blocking of the nose by a "soft, pink" (once "red") or sloughy mass, the latter watery or purulent, bloody only with sarcoma. When only the ethmoid was affected, the cheek was normal; in the four cases in which both ethmoid and antrum were involved the cheek was swollen twice, and the palate once, in this resembling the "antral" cases. On the other hand, the antrum only was affected in seven cases. The initial complaint in every antral case was of pain, swelling or "something" in the cheek, and in only one was the cheek not manifestly swollen; the hard palate was affected, and there was neoplastic tissue or discharge visible in the nose in four cases of squamous carcinoma, but nose and palate were apparently quite normal in the three cases of transitional carcinoma. In either distribution of disease epiphora, proptosis or diplopia may occur; glandular swelling is somewhat unusual in the early stages; and skiagraphic examination gave a characteristic picture in half the cases, and useful information in all.

Diagnosis.—The naked-eye differences between a mucous polypus and malignant tissue are sufficiently definite, but are likely to be appreciated most readily by the practised observer. A confirmatory biopsy should be made in every case, but not before arrangements have been made for adequate treatment at the same session; with this precaution a biopsy should not involve any appreciable risk. Since in the early and hopeful stages the symptoms and signs are not markedly different from those of suppurative disease of these parts, and since also it is highly important that the diagnosis should be made at this stage, and before dissemination has occurred, it should be a definite rule that any elderly patient with "polypi," swelling

No.	First seen.	Sex and age.	Site and type of growth.	First symptom.	Duration (months).	Nose.		Cheek.	Orbit.	Palate.	Teeth.	X-ray.	Glands.	Dose of radium in gram-hours.		Result, Alive Oct., 1934 without recurrence.
						Mass seen.	Discharge.							Nose, etc.	Glands.	
1	June, 1931.	F. 71.	E Mx.S.	Nasal obstn. and discharge (*a*).	4	Red, fleshy.	Sero-purulent; bloody once.	0	Slight proptosis mesial tenderness.	0	None	Ethmoid opaque.	0	3·3	0	Yes.
2	Feb., 1934.	M. 57.	E Tr.C.	Nasal obstn.† and discharge.	4	Soft, pink	Mucoid	0	0	0	Normal	—	0	2·5	0	Yes.
3	Sept., 1932.	F. 57.	EA Sq.C.	Nasal obstn. and discharge.	2	Soft, pink	Watery	0	Epiphora	Swollen.	None	A & E opaque.	0	2·1(*d*)	0	Yes.
4	May, 1933.	F. 74.	EA L–S.	Nasal obstn., disch., fetor.	8	Sloughy polupus.	Pus (occas. bloody).	Swollen tender.	0	0	None	" Erosion of bone."	†	1·7	2·3 (*e*, *h*)	Yes.
5	June, 1933.	M. 64.	EA Tr.C.	Nasal obstn. and disch.	7	Green slough.	Watery, fetid.	Slight pain and swelling.	0	0	None	" Neoplasm "	(*g*)	2·3	(*e*)	Yes.
6	June, 1934.	M. 44.	EA Tr.C.	Nasal obstn.* bad disch.	12	Soft, pink, fragile.	Muco-pus	0	0	0	Normal	" Neoplasm of A & E."	0	4·7	0	Yes.
7	Apr., 1932.	F. 66.	A Tr.C.	Numb cheek*†	1½	0	0	Swollen, v. tender.	Pain in eye, proptosis.	0	None	Bone erosion	0	4·0	0	Yes.
8	Oct., 1932.	F. 61.	A Tr.C(*f*)	Stiff, swollen cheek.	2	0	0	Swollen, painless.	0	0	0	" Probably neoplasm."	†	2·0	4·0	Yes.
9	Sept., 1931.	F. 47.	A Tr.C.	Painful, swollen cheek.	5	0	0	Huge red angry swelling.	0	0	0	Bone erosion	0	X	—	—
10	June, 1930.	M. 67.	A Sq.C.	Swelling in cheek.	6	Red, fleshy	Pus	Huge knobby mass.	Grossly invaded.	0	Few evil.	—	0	X	—	—
11	Mar., 1932.	M. 62.	A Sq.C.	Diplopia,* swollen cheek.	1	Firm red polypus.	0	Red, swollen painful.	Proptosis epiphora.	Swollen	Few evil.	Bone erosion	0	X	—	—
12	Mar., 1929.	F. 72.	A Sq.C.	Pain in cheek,† nasal disch.(*b*)	1	0	Foul pus	Pain; sl. tender.	0	Old sinus(*b*).	None	—	0	1·1(*k*)	0	Y.
13	Aug., 1932.	F. 75.	A Sq.C.	" Something in cheek," epistax.	2	Soft, pink	Bloody	Hard, tender hot swelling.	0	Swollen, sinus.	Few evil.	Antrum opaque.	(*g*)	4·4	4·2	Yes.

A = Antrum; E = Ethmoid; C = Carcinoma; L = Lympho-; Mx = Mixed cell;
S = Sarcoma; Sq = Squamous; Tr = Transitional.
* Followed influenza.
† Chronic nasal sinusitis.
(*a*) Injury to nose nine months previously.
(*b*) Discharge for 40 years following dental extraction.
(*f*) Biopsy specimen lost; clinically certainly malignant, probably tr.C.
(*g*) No glands when first seen, glands palpable two months later.
(*d*) Plus 10 radon seeds of 2 millicuries each.
(*e*) X-ray treatment.
(*h*) After block dissection of neck.
(*k*) Plus 240 c.cm. collosol selenium intravenous
X Too advanced for treatment.
Y No recurrence Dec. 1933, subsequent enquiries unanswered—death presumed.

or discomfort in the cheek, or a nasal discharge (especially if of recent appearance) should be submitted without delay to thorough and expert examination.

Treatment.—The surgical ideal—removal of the whole of the affected tissues, together with the lymphatic drainage area and a margin of healthy tissue, in one block—is hardly practicable. And even such modifications of it as have been practised entail a severe and mutilating operation, such as few elderly patients will support. But although the technique I now practise has only been on trial in its present form during five years, the results seem so promising that the need for any extensive operative procedure is disappearing. The principles at which I have aimed are: (1) complete irradiation of the whole of the affected tissues; (2) absolutely minimal disturbance of the parts involved and of the immediate neighbourhood.

Technique.—A general anæsthetic is necessary. The general scheme has been as follows:—

(A) When the antrum is affected: per-oral antrostomy, with removal of a considerable part of the bony anterior wall, and free exposure of the interior, but minimal disturbance of the contents of the antrum; careful placing of needles containing radium (0·6 platinum screen preferred) all round the walls, retaining them in place, if necessary, with packing brought out through a per-nasal opening; closure of the oral incision.

(B) Irradiation of the ethmoid by passing needles through the skin along the inner wall of the orbit and the lamina papyracea; and by introducing needles into the ethmoid cells via the agger and bulla cells by the per-nasal route.

(C) Irradiation of the whole of the inner surface of the affected tissues by needles supported in the nose on a flexible wire frame, moulded into place under direct vision through the nostril; this frame is well tolerated and causes little obstruction; it is made of silver wire of about 20 gauge.

(D) Pack (about 4 gram-hours) or X-ray treatment of glands if affected or suspect; in early cases, when the glands appear normal, they have not been treated.

The total dose for a primary growth of average dimensions, has been about 2·5 to 4 gram-hours giving an exposure of seven to ten days. Details are given in each case report. The one point to which special attention was directed has been the careful spacing and distribution of the needles and their fixation in place, so that every part of the obviously affected tissue is exposed to radiation from at least two needles not more than 1 cm. away. The position of the needles is checked by skiagram in every case. Where cervical glands have been obviously involved I have preferred irradiation to dissection,* since a block dissection of the neck is a formidable ordeal for an elderly, frail patient—and in any case it is impossible to remove the tissues between the glands and the primary growth. This may not be logically ideal, but I have been encouraged by the very good immediate clinical results from a treatment which is not unduly distressing to the patient and which has been well tolerated in every case in which it was attempted. It was not attempted in Cases 9 and 10, which were very advanced; nor in Case 11, a beery old man with gross damage in heart, lungs and kidneys and a positive Wassermann reaction.

Results of treatment.—In the ten patients treated as just described the immediate effect was a brisk radium reaction, clearly seen in nose, mouth, conjunctiva and skin. In no case was this distressing, though several patients appreciated the effect of normal saline irrigations. (The skin reactions following external packs to the neck were rather more severe, with superficial ulceration. In Case 6 a small slough separated from the dorsal surface of the tongue, healing being rapid.) As this reaction subsided a gradual atrophic process occurred in the nose. In three cases the oral wound broke down (Nos. 3, 8, 12), leaving an oro-antral fistula which required dental prosthesis. These were all cases in which the antral wall was involved in the disease: "apparently healthy" tissue seems to resist the irradiation well. In Case 1 the right eye had been nearly blind for six years before treatment, and the left eye became affected two years after exposure (? cataract behind corneal opacities); but I do not consider that the treatment had anything to do with this—in my experience *well-screened* radium in the orbit does not injure the eye. After two to four months the nose tends to show a greyish, knobby mass, representing the inferior turbinal, with some crusting in the upper part. Finally, in nearly every case there has been complete atrophy with disappearance of turbinals and antro-nasal wall, so that the nasal chamber becomes large and smooth; large crusts tend to collect, although the tendency diminishes as time goes on; but most of the patients find that a simple borax nasal douche adds materially to comfort. The sense of smell may be lost.

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* Both methods in one case of lympho-sarcoma.

Of the ten patients treated by the method described nine are well, comfortable and without any sign of recurrence. The tenth remained free from recurrence for almost five years (age 77), but has since not answered enquiries and is presumed dead.

CASES

Case 1.—Mrs. A. F., age 71. June 1, 1931 : She complained of a polypus in the nose during four months, with "catarrh" (i.e. obstruction) and muco-purulent discharge—blood-stained on one occasion. There had been an injury to the nose in September 1930. Slight left proptosis; pain and tenderness round inner half of left orbital margin. The inferior turbinal is replaced (or hidden) by a red, fleshy mass, bathed in sero-purulent discharge. Biopsy report : "Mixed-cell sarcoma." X-ray : left ethmoid opaque, antrum and frontal sinus probably full of mucus. June 12 : Ten needles, each containing 2 mgm. of radium, 3 cm. long, 0·5 mm. Pt. screen, inserted : (*a*) three into ethmoid by orbital route, one above the other, (*b*) three into middle and inferior turbinals, (*c*) four across septum of nose on wire frame support: total dose, 3·3 gram-hours. March, 1932 : Upper part of nose shows extensive atrophy of mucosa, middle turbinal a mere plate; lower part filled by firm grey mass—altered inferior turbinal; no glands. September 1934 : Apparently typical atrophic rhinitis, with only vestiges of turbinals; hard green crusts, and fœtor. (Right side, milder atrophy, no crusting.) Left eye going dim during ten months, right purblind six years—progressive corneal opacities right and left. General health very good.

Case 2.—Mrs. H. L., age 66. April 18, 1932 : She complained of a feeling of numbness in right cheek for six weeks, following influenza, with pain in right eye. The right cheek is slightly swollen and very tender, but not red; slight ptosis and proptosis, vision unimpaired. Palate normal, edentulous. No nasal symptoms, no discharge, nothing abnormal seen; no glands. Right temporal headache. W.R. negative. X-ray : left antrum opaque, apparent bone destruction in right malar region. May 5 : General anæsthesia. Per-oral antrostomy : the anterior bony wall of antrum eroded near centre just above gingival portion; lining membrane rather irregular and papilliform, some muco-pus in antrum, bleeding slight; appearance rather suggestive of malignancy, but tissue firm. Biopsy : Much of this growth is composed of fibrous tissue densely infiltrated with small round cells. The transitional epithelium has grown inward forming masses and cords throughout the fibrous tissue. These epithelial cells are definitely carcinomatous and growing rapidly—carcinoma of Schneiderian type. May 13 : Ten needles of 1 mgm. radium, 2·7 cm. long, 0·5 mm. Pt. screen packed into antrum in a fan-shaped manner. Three needles of 2 mgm. radium, 4·5 cm. long, 0·5 mm. Pt. screen, placed (1) in ethmoid, by orbital approach, (2) through middle turbinal, (3) through mucosa of inferior turbinal. Total dose: 4 gram-hours. September, 1934: Perfectly well, no sign of recurrence; mouth normal, moderate nasal atrophy.

Case 3.—Mrs. M. R., age 75. August 4, 1932: She complained that something has formed in the right cheek during two months—it comes and goes; recent hæmoptysis and epistaxis. Right cheek is hard, swollen and painful, hot, only slightly tender. No glands. Right side of hard palate is bulged downward, and pus exudes from a sinus in the gingival margin; a few horrid stumps. Right side of nose is filled with soft, pinkish, friable neoplastic tissue. X-ray: extensive opacity of right cheek, antrum and nasal fossa; ethmoid clear. August 10: General anæsthetic. The growth appeared to fill the whole nasal fossa, and had destroyed the antro-nasal wall and inferior turbinal; anterior wall of antrum very thin, no actual defect in bone. Radium needles inserted: (*a*) through gingival margin, two along outer wall of antrum, one along centre of floor—2 mgm. each in 0·5 mm. Pt. screen—a fourth along inner part of antral floor, 1·33 radium; (*b*) three diagonally through region of inferior turbinal, into growth itself, each of 1·33 mgm. radium, 0·5 mm. Pt. screen; (*c*) through orbital approach, one each of 1·33 mgm. into ethmoid and middle turbinal; (*d*) through cheek into antrum beneath orbit, each of 1 mgm. Total dosage, 4·4 gram-hours. Biopsy report: Rapidly growing squamous carcinoma. October 4: Glands of neck palpable, exposed, and 14 mgm. radium in 13 needles applied: dosage 4·2 gram-hours. February, 1933: Nose: chronic mucoid discharge, no growth or ulcer. Right epiphora and slight conjunctivitis. Hard mass in right side of neck. No pain; general condition good. October, 1934: No signs at all of any growth. Eye improving, but still has epiphora. Neck normal.

SUMMARY

Thirteen cases of cancer of the nasal accessory sinuses are analysed: the condition tends to affect elderly persons. Where the *ethmoid* is involved the complaint is usually of *nasal obstruction* and discharge. When the *antrum* only is affected, pain, swelling or stiffness of the *cheek* is the initial symptom, and nasal symptoms may be absent. Glandular involvement is late. Biopsy should be deferred until treatment is arranged. The technique of radium treatment is indicated; minimal disturbance of tissue is advocated. Of ten patients treated, nine are alive without recurrence. Three cases are reported in detail.

My thanks are due to Miss Sylvia B. Wigoder for assistance in arranging details of radium treatment and for "follow-up"; to Dr. A. D. Fraser for pathological reports; and to Dr. F. J. A. Mayes for radiological reports and treatment.

CANCER OF THE LARYNX

By CYRIL HORSFORD, M.D., F.R.C.S.
Late Surgeon, Throat and Ear Department, Princess Beatrice Hospital.

THE object of this article is to put on record four cases of intrinsic laryngeal cancer, all of which are of interest in that they demonstrate four degrees of severity, and illustrate four different methods of operative treatment, all of them with satisfactory results. The dreaded disease of cancer is, in the case of the larynx, not nearly so severe as is generally supposed. Success in treatment depends first on an early diagnosis which should be easy in cases of intrinsic cancer, as hoarseness is generally its first symptom, and calls for early inspection of the larynx by the aid of the laryngoscope. Unfortunately a great many cases are treated for months as simple laryngitis, sometimes merely for want of inspection; thus valuable time is lost. As long ago as 1909, in a paper on the treatment of laryngitis,[1] I said that the curability of intrinsic cancer of the larynx was in inverse proportion to the length of time that symptoms were treated by medical means, or the time taken to decipher a doubtful laryngeal image.

The surgical technique for the removal of the disease whether by laryngo-fissure or more severe measures, has improved so much in modern times as to render such operations safe procedures, almost free from risk. The problem of the treatment of such growths by irradiation, whether alone or in combination with surgery, has not as yet been definitely settled.

Case 1.—J. P., age 56, a hairdresser, consulted me on December 1, 1923. Complained of hoarseness for 1½ years, and stated that he had had almost complete loss of voice for nearly 6 months. On examination I found an extensive growth involving the right vocal cord, with an irregular outline two distinct prominences and extending some distance into the subglottic region. It did not involve the anterior commissure, but there was marked immobility of the cord. There were no glands in the neck, and those of his teeth that remained were in good condition. Before operating I showed the case at the Laryngological Section of the Royal Society of Medicine on December 7, 1923, where the diagnosis was confirmed by my colleagues, several of whom, however, expressed the opinion that the growth was too extensive for laryngo-fissure, and that total laryngectomy ought to be performed. With this I did not agree, and decided on the operation of laryngo-fissure. A few days later I performed this operation under chloroform anæsthesia according to the method described by Sir StClair Thomson,[2] but I removed the whole growth with the corresponding area of cartilage attached. This modification, which might almost be called hemi-laryngectomy, was decided on as I felt that it would render the cure more certain and that without more impairment of the voice. I removed the tracheotomy tube immediately after the operation as soon as the patient had recovered from the anæsthetic. He left the nursing home in a week, having had no rise of temperature, and scarcely any cough (Fig. 1). A section of the growth was cut, and reported by Dr. Benjafield as epithelioma of slow growth. It can probably be grouped in Broders' classification as Grade I. On examination a month ago (11 years after the operation) I found the man in perfect health, with a strong, resonant voice, and a large glottic space for breathing. There has never been the slightest sign of recurrence.

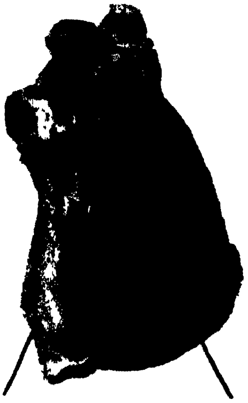

FIG. 1.—Intrinsic cancer of the larynx.

Case 2.—J. W., age 62, a clergyman, consulted me early in March, 1926, because of hoarseness of some months' duration, and on examination I found a small growth situated in the centre of the left vocal cord. Clinically it appeared to be a simple fibroma. His epiglottis was markedly overhanging, and I had therefore the greatest difficulty in seeing the growth, which naturally meant that its removal would be extremely difficult. I accordingly adopted the method which I introduced,[3, 4] my epiglottis forceps being used for the passage of a thread through the epiglottis, which could then be raised, and in this way the operation was facilitated greatly. I may mention incidentally that I always adopt this method in preference to direct laryngoscopy for such delicate operations as the removal of nodules from the vocal cords of singers, in whom the vocal result is vital to their career. The growth in the case under consideration appeared clinically to be a simple fibroma, and after removal by the indirect method with forceps this impression was confirmed by the naked eye. The remaining cord appeared to be healthy, but in view of his age I took the precaution to have the growth examined microscopically; two pathologists, Drs. H. A. Osborne and H. Scott Wilson, were definite in their opinion that it was a squamous-celled carcinoma. I therefore strongly advised the patient to remain under my observation for some time, and I told him that a more extensive operation would probably be necessitated later. In the meantime, however, some weeks after, he was recommended to Guy's Hospital, where he saw Mr. Mollison, who, finding no sign of growth, but hearing of the pathological report, advised a course of deep X-rays. This treatment was carried out by Dr. W. L. Watt, who gave him two full series of exposures (daily for one week each) by cross-fire to the larynx and surrounding areas. This clergyman's throat has been examined annually since. There has been no recurrence, and he has been able to continue his work as a preacher.

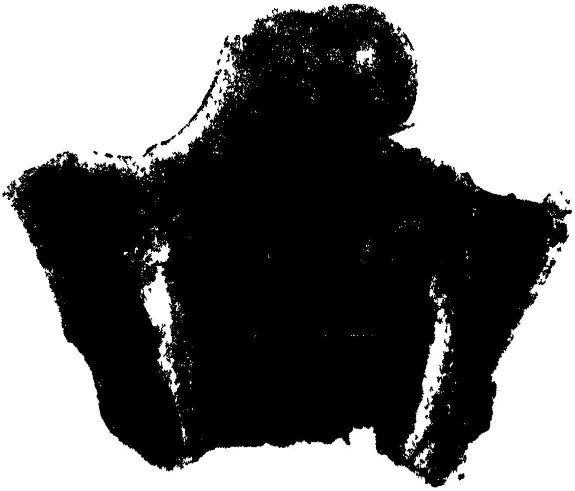

FIG. 2.—Intrinsic cancer of the larynx, affecting both vocal cords.

Case 3.—Mrs. H., age 71, came to the out-patients department of the Princess Beatrice Hospital (formerly Kensington General Hospital) in November, 1927, with complete loss of voice and marked stridor. Her history shows that she had been hoarse for some years, and increasing difficulty in breathing for a few months. On examination I found extensive epithelioma affecting both vocal cords, with marked limitation of movement. It was quite evident that the growth was malignant, but entirely intrinsic, without any evidence of glandular involvement (Fig. 2). She was admitted to hospital, and those of her teeth that remained were extracted, an essential preliminary to operation. About three weeks later I performed total laryngectomy under local anæsthesia, because of her age. Her convalescence was uneventful, and without any chest complications. When heard from some months ago she was still alive and there has been no recurrence. No radiation has been employed in this case. The biopsy of the growth by Dr. Ellison confirmed the diagnosis.

Laryngeal cancer in women is rare, and the late Sir Felix Semon [5] pointed out that the few cases which occur are almost always of the extrinsic variety. This case is therefore very rare.

Case 4.—C. H., aged 67, a clergyman, consulted me on April 6, 1933, and gave a history of hoarseness for eighteen months, during which time he had been having regular local treatment with sprays. He then came under the observation of two distinguished laryngologists who finally recommended that the whole larynx be removed as the only hope of certain cure. The patient informed me that at the consultation an alternative was suggested, namely, radium treatment, which the laryngologists said would probably preserve the voice, but that the disease would be more likely to recur and that in a short time. It was owing to this depressing prognosis that he sought another opinion. I agreed entirely with the view that the growth was most extensive, but was of opinion that it was entirely limited to the left vocal cord, with no evidence of the involvement of the framework of the larynx or the glands in the neck. I therefore considered it entirely intrinsic, and remembering the complete success of Case 1, which was only a very little less extensive, I felt quite convinced that by partial laryngectomy I could remove all visible growth and so save the patient the misery of permanent silence and loss of voice and of breathing for ever after through a tracheal opening. The operation was performed under local anæsthesia for the same reason that influenced me in Case 3, and the immediate result was equally satisfactory. Here again I removed the whole cartilage adjacent to the growth in one mass, and as the growth extended to the anterior commissure, I removed a small portion of the healthy right vocal cord beyond the growth. Posteriorly I removed also the anterior process of the arytenoid cartilage and the whole upper border of the thyroid on that side, so that this operation can really be called a hemilaryngectomy. The tube was removed the day after the operation, and the patient left the nursing home in a fortnight.

Realizing the severity of his case and with my experience of Case 2, I felt it my duty to leave no stone unturned to make certain of his cure, although I had satisfied myself at the operation every visible trace of cancer was removed. I therefore recommended him to the Radiological Department of the Middlesex Hospital under the care of Dr. Douglas Webster for a course of deep X-rays. I waited, however, five weeks until the wound had thoroughly healed before beginning this treatment. He had a course lasting one month (24 treatments) of the protracted fractional X-ray method of Coutard, and of which I understand the maximum dose was given.[6] There was no definite reaction within the larynx, but only slight redness of the skin, as a result of this treatment. This patient is now extremely well, with a very fair conversational voice and, though the laryngeal aperture has been narrowed by the needs of the operation, he breathes sufficiently well to enjoy walks of 15 to 20 miles without fatigue, and incidentally rides a motor-bicycle. The pathological report by Dr. H. Scott-Wilson of the section of the growth proves it to be carcinoma of a rather active type, and probably grade III of Broders' classification (Fig. 3).

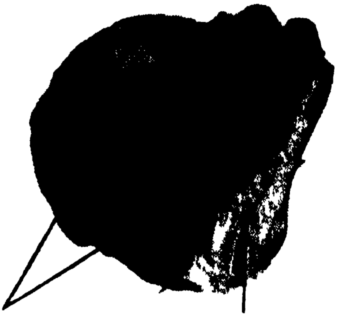

FIG. 3.—Intrinsic cancer of the larynx.

I would like here to express my gratitude to Mr. Edward D. D. Davis for his valuable criticism and assistance in Cases 1 and 4.

CONCLUSIONS

After a thorough perusal of the publications of such experienced surgeons as Thomson, Colledge, Mackenty, Glück and Tapia, it would appear that in the past total laryngectomy was the operation recommended in cases of intrinsic laryngeal cancer which has spread along the whole length of the vocal cord, and therefore leaving no margin of healthy tissue to be removed with the growth. I would therefore suggest that as a result of Cases 1 and 4 a less drastic and mutilating operation has been definitely proved to have been more justifiable. Semon stated that the word "cure" can be safely employed unless recurrence takes place within one year of operation. Thomson[6] states: "If cases come back with a growth within a year we may conclude it has been incompletely removed, if after a year then it is a recurrence." I am further satisfied that the modern technique of radiological methods has so far progressed as to render the possibility of recurrence an unlikely fear, and should it occur, its control by such means is a hopeful outlook.

Tucker stated in 1928: "The use of radium and X-rays is now generally conceded to have no place in the treatment of cancer of the larynx, except in some cases of post-operative radiation after laryngo-fissure or laryngectomy to prevent glandular invasion."[7] In addition, "Until radiation can show results as lasting as those which have been demonstrated to be attainable by surgery, it should be reserved for cases with indications which render them unsuitable for surgery."[8] Harmer, in reporting the experiences of the work of Finzi and Levitt in the radiological department of St. Bartholomew's Hospital during the last six years, considers that intrinsic carcinoma can be successfully treated by operation or by radium in most instances, and when it recurs deep X-ray therapy can give remarkable palliative results.[9]

In summarizing the above observations, I am forced to the conclusion that in all cases of intrinsic laryngeal cancer in which all visible growth can be removed by laryngo-fissure or partial laryngectomy, this should be adopted in preference to the more drastic total laryngectomy, and as a matter of precaution a course of deep X-rays should be given after the wound has healed (as in Case 4). Further, even in cases of more extensive invasion of the disease, in which a complete removal is doubtful, surgery should be first called upon and supplemented by radiation in some form.

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[7] Tucker, Gabriel: *Surg. Gyn. and Obstet.*, 1928, 308.

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A SYMPTOMATIC TREATMENT FOR THE COMMON COLD

BY A. T. TODD, O.B.E., M.B., M.R.C.P.
Physician, Bristol Royal Infirmary.

THE treatment to be outlined has been evolved slowly at the Bristol Royal Infirmary. It has proved itself to be highly effective, giving comfort within a few minutes, and apparent cure within about twenty-four hours, provided that the cold is treated as soon as the diagnosis has been made. When the cold is of some days duration, it gives a good deal of symptomatic relief. I do not propose to write at any length about it, for though its mode of action is open to dispute, the results of correct administration are definite and striking. Its action would appear to be two-fold :—First, an immediate antiseptic action on the naso-pharyngeal mucosa from the free chlorine in the chlorine mixture, with a delayed chlorine action from the ammonium chloride in the coryza mixture. Secondly, a decongestive action on the nasal mucosa from the salicylate-chlorodyne complex in the coryza mixture.

All subjects to colds should take a daily dose of one of the active preparations of vitamin B and of vitamins A and D; this dietetic addition alone is of considerable help. A subject of regular winter colds, i.e. a subject with chronic upper nasal sepsis, will find the colds much milder and less frequent if he regularly adds these vitamins to his diet. The preparations used as routine in this clinic are bemax, one tablespoonful, and radiostoleum, 3 to 6 drops, both once daily.

(1) CHLORINE MIXTURE

℞	Potassii chloratis	gr. L (50)
	Acidi hydrochlorici	♏ xxx
	Syrupi	℥ss
	Aquam ad	℥i

Allow the chlorate to stand in contact with the acid in a stoppered bottle for ten minutes. Then add some water and shake. Next add the calculated amount of syrup and any water to make up to volume. The dose is two or three drachms in one ounce of water for an adult. It should not be administered more than thrice in 24 hours and should be stopped after a day or two, or methæmoglobinæmia may result. This mixture does not remain active for more than about two weeks.

(2) CORYZA MIXTURE

℞	Sod. salicylatis	gr. vi
	Tinct. chlorof. et morph. co.	♏ v
	Ammon. chloridi	gr. v
	Tinct. cinchonæ co.	ʒi
	Tinct. catechu	♏ xv
	Syr. tolutan.	♏ xxx
	Ext. nucis vom. liq.	♏ ss
	Syr. limonis	♏ xxx
	Glycerini	♏ xv
	Aquam ad	℥i

This will appear to be polypharmacy of the rankest, but no single constituent can be omitted without unpleasant symptoms arising in some patients; as it stands it suits everybody. Minor alterations cause anorexia, nausea and even vomiting; one such experimental omission was followed by the unanimous vomiting of the whole of the dispensary staff at approximately the same time. This mixture keeps well in the dark. The dose is one ounce, but after the first dose, it is better to take half doses frequently than the full dose half as frequently.

(3) CHLORETONE NEBULANT

℞	Chlorbutol	gr. xv
	Camphor	gr. xxxvii
	Menthol	gr. xxxvii
	Ol. cinnam.	♏ iv
	Paraff. liq. leve ad	℥iv

This keeps well. It is not essential to the treatment, but definitely improves the results.

Method.—This will be given as for an adult, in order to save space; the doses should be proportionately reduced for the lesser body bulk of children. As soon as the cold is regarded as a certainty, the dose of chlorine mixture in water is sipped by drops, the fluid is not to be swallowed at once, but retained in the throat for as long as is possible. The patient should make this dose last for fifteen minutes at the least, so that there shall be effective chlorine action on the mucosa of the naso-pharynx. As it is somewhat irritant to the stomach, it should be taken after a meal.

About fifteen minutes later he should sip the coryza mixture diluted with equal parts of water; this need not be done so slowly as is necessary with the chlorine mixture, but the action is less apparent if it be gulped down. It may be repeated several times throughout the day and should be, even though the first treatment may have appeared completely effective. This mixture, which we call coryza mixture, alone gives much relief, and for a slight cold is frequently all that is necessary.

Both mixtures having been consumed, the patient should spray his nose thoroughly with the nebulant, and should repeat the process several times that day, even though symptoms have disappeared.

It should perhaps be added that the treatment here described is not applicable to patients with chronic sepsis of the upper nasal passages. These patients at first have a succession of colds during the winter, and then develop (1) recurrent mild broncho-pneumonia with X-ray shadows and occasional hæmoptysis—what I have termed the pseudo-phthisis syndrome—and, unfortunately, may be sent to a tuberculosis sanatorium; or (2) sensitization of the bronchi and asthma. The appropriate treatment for these patients is on the lines described by James.[1]

I should like to thank the dispensary staff of the Bristol Royal Infirmary for its zeal and the numerous personal experiments it has carried out with variants of this treatment; I have shared in some of these experiments and would warn potential alterers that the experiment may be very unpleasant, though apparently devoid of any danger—excess of the chlorine mixture being excepted.

Reference

[1] James, J. Angell. *The Practitioner*, 1933, cxxxi, 183.

A SHORT STUDY OF PSYCHO-ANALYSIS

By C. W. J. BRASHER, M.D.
Medical Superintendent, Woodlands Park.

I

ALTHOUGH psycho-analysis has been practised for more than fifty years, it has not been adopted generally, as was anticipated by Freud. He considers that British neurologists and psychiatrists are too conservative, and to the majority of practitioners it is but a name for an abstruse system that does not interest them. Nevertheless, a practitioner may have, at any time, to give an opinion regarding the advisability or otherwise, of psycho-analytic treatment. A consideration of the subject may be of service.

Psycho-analysis, like X-rays, was an accidental discovery. In 1880 Breuer, of Vienna,[1] was treating a young woman suffering from hysterical hallucinations. While hypnotized, the patient began to discuss the origin of her symptoms. Gradually she remembered occurrences that had contributed to produce her symptoms; she observed that these disappeared when their hidden causation was revealed to her consciousness. This patient, therefore, was the discoverer of psycho-analysis. Breuer recognized this, but did not realize its importance. Consequently, he did not pursue the subject, but left his notes untouched until he discussed the matter with Freud who, when studying in Paris, discussed the subject with Charcot. Apparently Charcot was not impressed. He was engrossed in the investigation of hysterical phenomena at La Salpêtrière, and it is perhaps not unjust to regard him as more interested in hysterical symptoms than in their treatment.

On returning to Vienna, Freud devoted himself to the treatment of the neuroses, and the formulation of his doctrines. While admitting the services rendered by

Freud in his exploration of the subconscious, and by his concepts of repression and conflict, it is regrettable that he has not recognized a debt to his predecessors, nor that former pupils and colleagues may have been justified in criticizing some of his doctrines. Genius is frequently intolerant of criticism and often fails to recognize contemporary merit. Freud attracted many followers, but his insistence on the sexual instinct as the primary force of human nature led to the secession of Jung, Adler, and of many others. W. Stekel was " expelled " by Freud in 1913.

Freud's followers compare him with Galileo, Columbus, Harvey, Newton, Darwin and Lister. These were distinguished by extraordinary patience, both in research and in controversy. Freud, on the contrary, makes dogmatic statements, which, by the nature of the subject, are frequently incapable of proof, and he exhibits impatience of criticism. This attitude estranges many independent thinkers, some of whom have been led, by Freud's impatience of criticism, to adopt an equally intolerant attitude towards his teaching. Other psychologists, having studied Freud's theories, have concluded that they are based on a precarious foundation. In 1924 six conferences on psychology were held in Brussels. Paul Sollier published a summary of the proceedings.[2] He drew a distinction between psycho-analysis, " a method of investigating the unconscious, and of treating certain neuroses and psychoses," and Freud's general teaching, which he described as " a pyramid resting on its apex." The basic principle of Freud's teaching is " psychological determinism—identical causes produce invariably identical effects." Is this true? It is a matter of ordinary experience that ill-health tends to produce temporary or permanent disability. Too often the patient accepts illness as a heaven-sent opportunity of escape from laborious or uncongenial toil. Yet many of the world's greatest have produced imperishable works while struggling against ill-health. Kant, Carlyle and R. L. Stevenson suffered from life-long illnesses that, in ordinary men would have been regarded as valid reasons for inaction. Determinism is but Calvinism in pseudo-scientific guise.

The majority of mankind (however illogically to the determinist) have believed in free-will; that man is master of his fate; that " a single event gives rise to numerous chains of associations, or that different events may result in the production of one single idea " (Sollier). An indeterminate " personal equation " may decide the individual issue. Determinism is opposed diametrically to the belief in " emergent evolution " (Lloyd Morgan). Freud's concept—" the censor "—does not harmonize with the determinism upon which his whole doctrine rests. Sollier inquired: " Why is the ' censor ' only a product of fear and shame; why may not kindliness, health and a love of right living take part in forming our moral conscience ? "

Freud's work, " On the Interpretation of Dreams," abounds in dogmatic assertions without reasoned attempt at explanation of his statements; these are always of a sexual nature. It is incredible that every terrifying or unpleasant dream is a symbol of some sexual impulse. Many have dreamed that they were standing, scantily clothed or naked in a familiar public place. Their sole desire was to return home as speedily as possible, unobserved by passers-by. The sense of shame and mortification was acute, and it is impossible to believe that this dream was an unacknowledged sexual impulse, in fantastic guise, designed to elude " the censor." A follower of Freud, when asked to explain this dream, replied, after some hesitation, " It is a form of exhibitionism ! " It is admitted generally that exhibitionism is a perversion, probably allied to sadism and masochism.[3] The pervert derives pleasure from these acts, yet the normal person who dreams of exposure in a public place experiences a most painful emotion, the antithesis of sexual desire. Another usual dream is that of falling from a height. Naturally, it is accompanied by painful sensations. How can this dream be symbolic of a sexual impulse, so abhorrent to the dreamer that it appears in such a form that the "censor" will fail to detect its true meaning? In the elaboration of his theory, Freud found the concept of the "ego" to be inadequate. He therefore postulated the "super ego," and behind both discovered subsequently the mysterious "id." But this is not original. In 1840 Oliver Wendell Holmes wrote: "We speak of ourselves as individuals, we should regard ourselves rather as whole communities." Both concepts recognize the "many-sidedness" of human personality. Many a man is a potential Jekyll and Hyde.

Discussion of Freud's central doctrine of the "Œdipus complex" lies outside the scope of this article, but when regarding this "complex" as a stage in normal infantile sexual development, Freud appears to misinterpret the basic idea of the Greek tragedy. Laïus, Jocasta and Œdipus were the unconscious victims of inexorable fate that punished parricide and incest as crimes, abhorrent to gods and men. By his own admission, Freud's speculations have not reached finality. He closes the retrospect of his life's work on a pessimistic note: "I have made all sorts of beginnings and have scattered many impulses abroad, and something should come of them some day. I cannot say myself whether it will be much or little."[4] This is reminiscent of the final pessimism of Solomon: "Of making many books there is no end, and much study is a weariness of the flesh."[5]

II

To turn now to some results of psycho-analysis. The trend of Freud's determinism is inevitably pessimistic. In an earlier work he quotes Ambroise Paré's saying, "I dressed it, God cured it," adding, "The analyst might well content himself with something similar."

But later experiences appear to have produced a profound dissatisfaction. He has seen antagonism and secessions on the part of former colleagues, and cases of suicide among psycho-analysts and patients. "Just as Freud's work resulted from a gigantic struggle with himself, which is evident in his repeated changes of view, so did the development of his school proceed amid mighty and critical rifts and secessions, amid the gravest struggles of conscience, too, which drove some of his adherents to their death, to voluntary self-destruction."[6] The following cases prove that the dangers of psycho-analysis have not been exaggerated :—

Case 1.—A medical practitioner who submitted to prolonged psycho-analysis became so depressed by the "revelations" of his subconscious, that after months of misery he committed suicide.

Case 2.—A schoolmaster, aged 62 years, suffering from recurrent "depression," submitted to analysis on fourteen occasions. He then developed amblyopia and contraction of his visual fields. In spite of the absence of pain and of prismatic halos, a diagnosis of glaucoma was made and iridectomy was performed on both eyes. The patient declined further pyscho-analytic treatment, as he stated that at the first consultation the analyst said, "I am going to frighten you!" The patient made two suicidal attempts subsequently. He has had several hysterical fits, and after temporary improvement his anxiety state persists.

Case 3.—An unmarried woman, aged 41 years, had an accident to her right eye at the age of 24. She had eight operations, terminating in enucleation of the eye. She developed severe hallucinosis. Psycho-analysis was advised and a four months' course of intensive analysis was undertaken. Her hallucinations and delusions have increased. She has sexual obsessions : discusses the "Œdipus-complex," believing that her mother's step-sister is her mother's child by the patient's grandfather. She is now suffering from advanced paranoia and the menopause is commencing, consequently the prognosis is grave.

Case 4.—A University graduate, unmarried, aged 47 years, suffering from severe anxiety neurosis received psycho-analytic treatment from the analyst who treated another patient (*Case* 2). His mental condition was not relieved and he committed suicide.

Case 5.—A young unmarried woman who had received treatment from this psycho-analyst committed suicide also.

Case 6.—A demobilized soldier was invalided for "neurasthenia." He appeared before a Medical Board, and was submitted to psycho-analysis. The word "snake" caused a violent hysterical attack, resembling that described by von Hattingberg[7] (who terms it an "affect-explosion, seen only in war-neurotics"). The analyst concluded immediately that this reaction to the word "snake" could have but one interpretation—it was a "phallic symbol." Further attempts to elucidate this resulted invariably in recurrence of the hysterical fit. Subsequent investigation (without psycho-analysis) enabled the man to tell his story: "On a wild autumn night, with torrential rain, he was on sentry duty beneath the crumbling wall of a Turkish cemetery in the Vardar valley. Suddenly, something cold and clammy touched his neck. A large snake slid over his shoulder and dropped into the runnel at his feet. He fainted and was picked up, unconscious, by the guard. This terrifying experience left a deep impression; he repressed his desire to confide in anyone. 'I dreamed of snakes night after night.'" Naturally, this repression produced the "neurasthenia" for which he had been receiving a temporary pension. After a time he was able to talk freely of the incident, and he made a rapid recovery. The danger to the patient is shown by change of attitude towards the analyst, even when he admits having derived benefit.

Case 7.—A married woman became hostile to the analyst, and refused further treatment. She was a neurotic heroin addict, aged 40 years. She stated that the psycho-analyst asked questions regarding her sexual life which she resented. The analyst remarked: "Before you have finished you will tell me everything—I shall be as God to you!" The patient declined to continue treatment.

It is obvious that the success of any therapeutic method depends greatly upon the establishment of mutual confidence—*rapport*—the patient must believe that the physician understands his case and sympathizes with his sufferings, and the physician should be able to convey to the patient the impression that, at the moment, the patient's case is all important. Neurotic patients quickly detect signs of impatience or inattention, and lose confidence accordingly.

Although Freud describes psycho-analysis as "gold" in comparison with the "copper" of other psycho-therapeutic methods, suggestion and persuasion (with or without hypnosis) have been successful in a large number of cases, and it is evident that the essential "rapport" may be established by these methods. Why, therefore, resort in the first instance, to a method that has admittedly serious dangers? Is it not more reasonable to reserve psycho-analysis for cases that are not amenable to suggestion and persuasion?

III

Two other possibilities have not received the attention that they merit: (A) Telepathy or thought-transference has occurred in many well-authenticated cases: for example, Stuart Cumberland, the "thought reader," was able to identify a five-pound note and to give its serial number when the note was in Mr. Gladstone's waistcoat pocket. Professor Gilbert Murray was successful in a large proportion of his experiments[8] in thought-transference. Dr. William Brown records a remarkable example of the "accidental" transference of an "imaginary" Greek word to the mind of another classical scholar.[9] The fact that the laws governing these phenomena remain undiscovered does not justify disbelief in their existence. Many mysterious natural forces (e.g. "Hertzian waves," "cosmic rays") exist, although the laws governing their action remain undiscovered. It appears probable that a pyscho-analyst may transfer his thoughts to the patient's subconscious mind and so influence the patient's replies during analysis. The peculiarly intimate relation of the patient to the analyst must facilitate this. If the analyst's mind be filled with Freud's theories, may not the patient respond by giving replies suggested subconsciously?

(B) The desire of the neurotic to confide in or to confess to another, and thus to obtain relief and consolation. Several years ago an Anglo-Catholic priest, when regretting that the practice of Confession was not more general among his congregation, said: "I do wish that more would come to Confession, and that some would come less frequently. I cannot help feeling that some 'penitents' confess imaginary sins in order to experience the consolation of absolution." Thus the neurotic or psychopathic patient under abnormal conditions may be induced to admit imaginary errors of conduct. The "Oxford Group Movement" is reproducing some of the hysterical phenomena that accompanied the Reformation in certain parts of Germany, and the eighteenth-century Evangelical

Revival in England.

IV

William James' touchstone for the validity of any system is, " How does it work? " " What will be its ultimate effect? " " The attitude of looking away from first things, principles, ' categories ' supposed necessities, and of looking towards last things, fruits, consequences, facts."[10] This is the ultimate test of every system. Each psycho-therapeutic method must be judged by its results. Failures as well as successes must be recorded. It may be difficult to assess results of psycho-therapy as those of other branches of medicine are assessed, but facts and results are the standards by which every system must stand or fall. Many British and foreign psychiatrists have expressed doubt regarding the utility of psycho-analysis and their criticisms can be answered only by the production of records of successful cases, and of failures. The cases described above must be regarded as failures, and no other instance in which the patient has derived benefit from psycho-analysis has occurred in the writer's experience. Time will show whether methods that involve grave dangers can offer compensatory advantages or, conversely, whether they will increase the incidence of psychoses and neuroses.

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MEDICO-LEGAL PROBLEMS IN GENERAL PRACTICE*

XI.—NEUROSES AND PSYCHOSES IN RELATION TO VIOLENCE

By WILLIAM A. BREND, M.A., M.D., B.Sc.

Of the Inner Temple, Barrister-at-Law; Lecturer on Forensic Medicine, Charing Cross Hospital; Medical Referee under the Workmen's Compensation Act; late Neurologist to the Ministry of Pensions.

DISORDERS of the mind, observed after a shock, may come before the practitioner in connection with treatment or in relation to claims for compensation or damages. For either purpose it is necessary to be familiar with modern views on the etiology of these conditions, and if a medical witness intends in a Court of Law to express a strong opinion as to the part played by violence in their causation, he must be prepared to face a stiff cross-examination.

The claim that more or less persistent mental symptoms were apt to result from a physical or mental shock or combination of the two, was first put forward by Beard and other American physicians about 1870. In succeeding years various terms, such as "railway spine," "nervous debility," "spinal concussion," were employed to describe the condition, these eventually giving way to "traumatic neurasthenia," which was supposed to be indicative of the origin. But even in the early days some writers threw doubt on the purely traumatic basis of the syndrome.

LESSONS OF THE WAR

The war gave rise to a large number of these cases and much advanced our knowledge of their causation. It will be useful first to study the war experiences since the neuroses seen in civil life which result from, or are claimed to result from, physical or mental shock, differ in no essential respect from those observed in the fighting forces. The term "shell-shock" came into use during the earlier days of the war and was applied rather loosely to many forms of mental disorder. In view of the unexpectedly large number of the cases, factors unknown, or at all events rare in civil life, were thought possibly to be responsible, and investigation was directed towards the effects of increased atmospheric pressure in the vicinity of an explosion, poisoning by carbon monoxide, and other physical agencies. Mott laid stress in some cases upon minute hæmorrhages into the grey matter of the cerebrospinal axis, and many of the earlier investigators attached importance to hereditary influences, a significant recognition of a pre-war factor. Some worthy persons blamed alcohol and urged the abolition of the rum ration, but this led to an investigation which quickly showed that the neurotics were less addicted to alcohol than the average man. Gradually it came to be recognized that no scientific precision could be given to the word "shell-shock." Similar symptoms were presented by men who had had widely different experience; cases were cropping up among those who had not been wounded or blown up, and even those who had not been under fire. After elimination of the psychoses and wrongly diagnosed early cases of organic nerve disease, most of which were instances of disseminated sclerosis, it was found that the remainder consisted chiefly of our old friends hysteria and anxiety neurosis with some obsessional cases, and the term "shell-shock" then ceased to be used. It had been an unfortunate designation in any case, since it conveyed a wrong impression of the etiology and suggested an atmosphere of warfare, perhaps gratifying to the sufferer, but not always based upon fact.

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* This is the eleventh and concluding article in the series on medico-legal subjects.

The variation in the liability of men to develop neuroses was very marked. Some broke down after terrifying physical experiences, such as being blown up or buried, and others after prolonged bombardment, though without having been hit. In some cases it was the horrible sights of warfare which appeared to have affected a man most, and yet in others there was not any apparent cause, or the assumed cause was inadequate to have produced the symptoms in a normally constituted person. The official statistics show that more than one-fifth of the neuroses occurred among men on home service. Such marked variation clearly indicates pre-existing, temperamental differences.

But while any type of case might occur in any environment, certain broad generalizations on the effect of shock could be made. Hysterical symptoms, such as paralyses, disorders of sensation, aphonia, stammering, irregular gaits often of a bizarre character, were seen most often among those who had sustained a physical shock, and occurred immediately after. " Reflex spinal contraction " was a term applied to a group in which strong muscular contractions were associated with a wound, obviously not organically responsible, and sometimes even trifling. These proved more intractable to treat, but did not differ essentially from other functional contractions. Hysterical symptoms usually responded well to the simpler forms of treatment by suggestion, encouragement and physical exercises. In some cases, an anxiety state became manifest as the symptoms disappeared, these being examples of " conversion hysteria," the symptoms having served as an outlet for the repressed emotion.

A characteristic group of symptoms was shown by many of the men who had been blown up. These included amnesia for periods of war experiences varying from a few hours to months or years or even extending to pre-war years, terror dreams usually of war horrors, and phobias for traffic, crowds and noise. Repression of immediate war experiences was the psychological process which had occurred and by bringing back the lost memories into consciousness either by association or by hypnotism, the symptoms usually rapidly disappeared. It was perhaps in this group that war strain played the largest part, yet all the symptoms could be shown by men who had not actually been exposed to danger. Anxiety states, with or without hysterical symptoms, might occur in any environment and proved the most resistent, whether they occurred "spontaneously" or in the course of any other affection or injury.

Under treatment it was possible to determine the psychic factors more closely. Certainly in some cases terrifying experiences had precipitated the final collapse. Even in men of courage and determination, who had perhaps served for long periods in the front line, the limit of endurance could be reached, and the supervening of an acute hysteria or anxiety state led to their removal from the battlefield. In this type of case the prognosis was good and happily it is safe to say that the great majority recovered within the first two years after the war.

But many other factors might be operative. Resentment of authority, fear of showing cowardice, remorse for some supposed act of negligence, burden of responsibility, especially among officers, separation from home, and disturbing family news, all at times played a part. In those who broke down without having been in danger, fear was apt to be regarded as the cause, but this was often unfair. Many of these men failed owing to their hopeless inability to adapt themselves to disciplinary conditions. Those familiar with psycho-analytic teachings will appreciate how devastating can be the influence of a rough-tongued sergeant on one already affected by a "father complex." Of course, behind these immediate causes, deep-seated repressions were at work and, as might be expected, those who broke down most readily—from excessive clerical work at the base, for instance—proved the most difficult to treat.

NEUROSES OF CIVIL LIFE

When now we turn to the neuroses seen in civil life which are associated with violence, we find exactly the same factors operating. The psychic concomitants of an accident play a large and even the largest part in precipitating a neurosis, and in all but the mildest cases a neurotic substratum is found to have been present before the accident. The general types of cases seen are also the same. Purely hysterical symptoms, paralyses or stocking anæsthesias are more likely immediately to follow a severe physical shock, and may complicate organic injuries. Usually these clear up within a few weeks or months of the accident, but they may be associated with, or followed by anxiety states. It is said that symptoms are more apt to persist if questions of compensation are involved, but in my experience this influence, if it acts at all, is less likely to apply to pure hysteria than to anxiety conditions. Hysterical symptoms alone are now rarely the subject of claims in the Courts, but the tendency of insurance companies to settle these cases as soon as their liability is established, must be remembered. Some functional increase in the degree of disablement, when organic injuries have been incurred, is more often seen. Nor now do anxiety neuroses often reach the stage of a Court hearing unless they form an additional claim to a definite organic injury. Undoubtedly the attitude of the Courts towards these affections has changed in recent years. "Traumatic neurasthenia," once looked upon as of serious import, is now apt to receive rather a chilly reception. Partly for this reason, and partly in the belief—not always justified—that the sooner the compensation is settled, the sooner the condition will improve, both sides are usually more anxious to settle than to risk the outcome of a fight in Court.

The psychic factor may exercise its effect either before or after the physical shock, or both. When investigating a case therefore, particular attention should be paid to the actual circumstances of the accident. Symptoms are more likely to follow when the occurrence was preceded by a state of terror than where there was no warning. A throw from a bolting horse, a collision in a car seen to be inevitable, a railway crash preceded by violent movements and sudden jarring of the brakes, a fall of twenty feet, all provide examples of accidents in which the sufferer has ample time fully to realize his danger before the actual impact occurs. On the other hand, a person struck from behind or by something falling on his head of which he has no warning, experiences at the moment only the physical effects. Brief as this antecedent period of terror may be, it is in my opinion an important factor. Terror may also be felt after the crash, though the sufferer may now be too dazed or bewildered to appreciate his position. Suggestion of injury may be another factor at this stage. If the circumstances are such that the injured person can quickly be assured that he has not been seriously hurt, or can re-assure himself as when, for instance, after a fall on a lonely walk he must look after himself, the psychic effects of the accident should be slight. If on the other hand, an injured, but fully conscious, person is surrounded by others who shew great apprehension and perhaps rush him off to hospital, he is likely to develop a state of terror the effects of which may be more or less persistent. When both terror before the accident and strong suggestion of grave injury afterwards are present in one already of neurotic disposition, the conditions for the appearance of "traumatic neurasthenia" are at their best.

Clearly the state of terror associated with an accident need have no relation to the gravity of the injuries actually received, and that there is little correlation between the severity of injuries and the appearance of a neurosis, is a matter of common observation. Excellent recoveries may occur without any nervous manifestations after the greatest of organic injuries, while severe neurasthenic symptoms may be shewn where the actual violence has been small. The view has been put forward that when a man has an obvious injury he is not so likely to develop a neurosis since he is already provided with an emotional outlet. This suggestion, however, is not borne out by observation. The immediate effects of a grave injury are likely to mask those of a neurosis, but the latter may become manifest as improvement occurs. Again, a definite injury may relieve a man from anxiety by placing a question of compensation beyond doubt or by necessitating his removal from a theatre of war. But anxiety arising from a real, external cause should not be regarded as a neurosis. It was not the experience of the war that neuroses were limited to unwounded men.

Equally important too in accidents in civil life is the part played by pre-existing liability, though this may only become recognisable during the course of the illness and after investigation of the life history. As with war cases, hysterical symptoms are more likely to appear immediately after an impact, and usually under appropriate treatment disappear in no great interval of time, leaving in the tougher-minded no permanent effects. Anxiety conditions are more likely to persist and point to an ill-adjusted foundation.

Those who take the view that malingering often plays a part in these claims have urged that the neurosis is merely the expression of a subconscious desire to draw, or continue drawing, money without working. Such desire, however, in an injured man is legitimate and it is difficult to see how it could be " subconscious." Nevertheless, acting on this principle the Courts and insurance companies have tended to settle claims by payment of lump sums instead of weekly allowances, believing that thereby they promote rapid recovery. Unfortunately this optimism is not always justified. In many cases the symptoms persist long after all questions of compensation or damages have been settled, and neuroses associated with accident may appear in persons in whom these questions have never been in issue. A neurosis is a very real thing, and when a case is immediately curable by a money payment, another name for the condition would be more appropriate. Naturally, insurance companies claim to be justified by results and certainly some cases settled by a lump sum cease to show anxiety. Probably these are cases in which there has been failure to distinguish between neurotic anxiety and anxiety due to adequate external cause. If a working man with a dependent family does not know where tomorrow's breakfast is coming from, he is likely to be in a severe state of anxiety, which will obviously be relieved by the payment of a good round sum. But this is not a neurosis. The characteristic of anxiety resulting from a psychic conflict is its apparent independence of external, existing cause. Attacks occur abruptly, and often the sufferers will admit that they do not know of any adequate reason for them or they may rationalize their experiences and claim for their symptoms causes which are clearly incommensurate with the distress displayed. These symptoms are not relieved by improvement in economic conditions, though the form of their expressions may be changed, and I have known many men who consciously had the strongest motives for continuing their work compelled to relinquish good jobs owing to the phobias or anxiety which had become attached thereto. The distinction between the two conditions is not difficult to make to those accustomed to dealing with such cases.

Some remarks on the *prevention and treatment* of these neuroses may be useful. The first thing to be done after an accident of course, is to determine whether or not the person has been seriously injured. This possibility having been excluded, the less he is made an invalid, and the less suggestion that is made of " shock " or of possible future ill-effects, the better. To send a person to hospital unnecessarily can only do harm, though if the circumstances do not permit of prompt and satisfactory examination, transference to hospital may be the only course. First-aid staffs sometimes err on the side of caution in this matter.

I was recently in a slight railway collision in which the passengers received rather a severe shake, but nothing worse. The station was reached after an hour's delay, and there uniformed attendants with stretchers were ready. After a most cursory examination, persons who obviously had not been seriously hurt were taken to hospital, where they were " not detained." It was amusing, indeed, to watch one of these persons walk quite unaided out of the carriage and comfortably compose herself on the stretcher in order to be carried to the ambulance. After an accident railway companies must clearly take all reasonable steps to help the passengers, but such proceedings as occurred on this occasion not only conduce to the development of a neurosis, but play into the hands of the fraudulent claimant.

Later treatment must be based on the principles usually followed with the neuroses. Hysterical symptoms, paralyses, and anæsthesias, if uncomplicated by organic injuries, generally yield to the simpler forms of treatment by suggestion which can be given verbally or by electric currents, physical exercises and manipulation, the patient being thereby restored to his pre-accident condition. Those with anxiety states can be re-assured, but if the condition persists, investigation of influences other than the accident is called for. In the young and intelligent, treatment on psycho-analytic lines gives the best result, but if the circumstances of the patient preclude complete investigation, a modified form of psycho-analysis is often helpful. Failing this, we must fall back upon suggestion and encouragement which unfortunately in these cases have rarely more than a temporary effect.

THE PSYCHOSES

It is generally held that an injury to the head involving intracranial structures may be a precursor of insanity; and it is also assumed that severe and prolonged mental stress may, at least, be a precipitating factor in that condition. Yet it is surprising how little evidence there is for either view. Injuries to the head of all degrees of severity are among the commonest of accidents, yet the proportion of cases in which psychotic symptoms follow is remarkably small. In 1931 the Ministry of Pensions followed up the history of 17,305 cases of gunshot wound of the head and in only 59 of these was there a record of a psychosis having developed.*

As regards the effect of mental stress, it would be impossible for human beings to go through more trying or ghastly experiences than the troops were subject to in the front-line trenches, often for periods of years, yet the incidence of insanity among these men was amazingly small. The statistics published in the volume "Casualties and Medical Statistics" of the Official History of the War, show that out of approximately 6,000,000 troops, excluding Dominion and Indian forces, who served from August, 1914, to November, 1918, the total number of cases of insanity which were regarded as caused or aggravated by war service, was only 13,030.

It is not possible to give an exact annual admission rate for psychosis per 1,000 of strength of the Army, during the war, since up to 1916 the records did not differentiate between neuroses and psychoses, but from the available figures it appears to have been well below 1·0 per thousand. The average peace-time rate for the years 1927–31 was 0·9 per thousand. The admission rate to the County and Borough Mental Hospitals under the Board of Control, for the year 1921, was 0·84 per 1,000 of the male population aged 16 and upwards, in England and Wales, but this figure does not include those in Public Assistance Institutions and Municipal General Hospitals nor those in receipt of outdoor relief. Further, the Army admissions would include practically all cases, while in the civilian population many mild cases and even certifiable cases are not in fact certified. The two figures are not therefore strictly comparable, but it is evident that the admission rate in the Army during the war was well below the rate in the civilian male population, and did not differ appreciably from that prevailing in peace.

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* I have to acknowledge with thanks the permission of the Ministry to publish these figures.

From 1916 onwards psychoses were recorded separately and more detailed information is available. In an analysis of 1,043,653 British *casualties* admitted to medical units during the years 1916 to 1920 inclusive, there were 3,208 cases of mental disease, of which 2,249 were discharged as invalids, and 603 returned to duty, the remainder being accounted for by deaths (76) or incomplete records. This gives a general rate of about 3 per 1,000 casualties. Of the total number, 1,219 occurred in the United Kingdom; 1,511 in France, and the remainder in the other seats of war, a distribution which in relation to the relative numbers at risk does not show any higher incidence in the overseas troops. The distribution in relation to arm of the service is significant. Confining attention to non-battle casualties (diseases, etc.) the incidence of psychoses in the Labour Corps, who were less severely exposed than the front line troops, was about 8·9 per 1,000; in the

Infantry and Machine Gun Corps it was 3·4 per 1,000 casualties. The greater incidence in the Labour Corps was probably due mainly to the higher average age and consequently more severely felt effects of alcoholism and syphilis. All these figures show conclusively that the terrible stress and strain of the war was not sufficient to neutralize the advantage derived from the fact that the Army was a picked population.

Examination of individual records taught the same lesson.

To quote an actual case, a man who joined the army in 1912 was discharged with acute mania after about a year's service and was transferred to a mental hospital. He was discharged from the hospital towards the end of 1914 and re-enlisted early in 1915, being shortly afterwards sent to France as an already trained man. He served almost continuously in the front line and was discharged in 1919 with a pension for a wound in the leg. During the whole of that period he did not show any mental symptoms, and he had a good conduct record. Then, in 1930, he suddenly had another attack of manic-depressive insanity for no apparent reason. Here, then, was a man, clearly liable to a psychosis, who joined up immediately after recovering from an acute attack, yet four years of front line warfare had no apparent effect upon his mental condition.

This was by no means an isolated case. We do not know—only partly know—the etiology of many of the psychoses, but it is safe to say that physical violence and mental stress from external cause can be ruled out as factors of any appreciable import.

We may conclude with a purely legal point. Striking as the war statistics are, a medical witness must not rely on being able to quote them in the witness box in support of an opinion he may have expressed. In a recent High Court case I wished to quote the official statistics, but though compiled in a Government Department and published by the Stationery Office, the Judge ruled that they were inadmissible as evidence.

CASE REPORT:

POST-VACCINAL ENCEPHALITIS

By JOHN W. BROWNE, M.B., B.CH.

THE following case may be worth putting on record because of this comparatively rare, though important, complication of vaccination, and because of the simple and successful treatment.

A child was seen by me on February 24, 1934, with the following history: Since vaccination on February 20, 1934, there had been loss of weight and colour. The child, who had the usual healthy pock mark, weighed 16 lbs. 4 ozs., and was very flabby and pale, but otherwise nothing abnormal was found. The mother had been feeding the child on a mixture of cow's milk 1 part and water 4 parts, so I adjusted the feeding to equal parts of cow's milk and water, with the addition of one teaspoonful of dextrose to each feed. The mother was told to bring the child back in one week's time, unless it became worse in the meantime. I did not hear anything more about the patient until called to see it on March 8, twelve days after the previous examination, and sixteen days after vaccination. The child was very weak and pale, showed well-marked retraction of the head and made a peculiar sighing kind of cry. There was a prominent papular rash all over the trunk, rigidity of neck muscles was pronounced, and the chest showed a mild degree of bronchitis. A provisional diagnosis of post-vaccinal encephalitis was made.

I referred the patient to the Belfast Hospital for Sick Children, where Dr. Howard Crozier examined the child and performed lumbar puncture. The cerebrospinal fluid was under great pressure, and was quite clear. The rash he regarded as generalized vaccinia, and confirming the diagnosis of post-vaccinal encephalitis, recommended oral administration of hexamine and intramuscular injections of whole blood.

The child was not admitted to hospital. I gave the child hexamine gr. iii three times daily in its feeds, and six intramuscular injections of whole blood (parental) on the following dates and in the following amounts: March 9, 4 c.cm., March 10, 5 c.cm., March 13, 5 c.cm. (maternal blood); March 17, 5 c.cm. (paternal blood); March 23, 5 c.cm., March 25, 5 c.cm. (maternal blood).

After each injection the child appeared a little better for about two hours, during which time it slept. After the third injection the head retraction was much less pronounced, and I concluded that the treatment was beneficial. The fourth injection, which was paternal blood as the mother was unwell that day, seemed to upset the child, as it became fretful, pale and very restless, unable to sleep. After two further injections were given, the child rapidly and completely recovered.

PRACTICAL NOTES

THE REPAIR OF DIFFICULT AND RECURRENT HERNIAS

In the remarkable treatise of Astley Cooper on hernia which appeared in 1804 the pathogenesis and anatomy of hernia were accurately described in a manner in accord with later-day conceptions. Operative efforts in the treatment of hernia, however, remained limited to the release of strangulation. Even the advent of anæsthesia and asepsis awaited the perfection of an adequate technique before surgery could offer sufferers from this malady promise of prolonged relief. In 1889, Bassini came forward with the description of his operation for the repair of inguinal hernia, which procedure, together with contributions from numerous sources, established permanently the worth of the operative method in dealing with hernia. The passing years have indicated, nevertheless, that a number of cases remain refractory to the usual method of repair. The high incidence of recurrence of direct inguinal hernia repaired by the ordinary hernioplastic technique is indicated by every report in which the ultimate results are carefully scrutinized. Owen H. Wangensteen, of the Department of Surgery, University of Minnesota, presents (*Surgery, Gynecology and Obstetrics*, November, 1934, lix, 766) a method for the repair of difficult hernias and large defects of the abdominal wall through the employment of the iliotibial tract of fascia as a flap, pedicled on the tensor fasciæ femoris muscle. This muscle may be swung upward with its nerve and blood supply preserved intact. The transference of this musculotendinous graft may be easily made and its loss to the thigh does not compromise any function which it ordinarily performs. In the repair of large defects of the abdominal wall in which the loss of tissue precludes approximation, this pedicled graft is best drawn beneath Poupart's ligament with the superficial or fatty side down and sutured into the defect. In the repair of hernias, it is best brought up over Poupart's ligament and incorporated in the closure, the flap being slightly rotated at its base, so that the superficial or fatty side remains up. In difficult recurrent inguinal or femoral hernias, this flap of fascia may be intimately incorporated with the suture of the adjacent tissues. In the repair of incisional hernias, the flap is best sutured as a patch over the site of closure, it being anchored securely to the normal adjacent fascial structures. In the use of this strong sheet of fascia pedicled on a muscle whose blood and nerve supply remains preserved, one has available a simple but effectual and practical method for the mending of difficult hernias and large abdominal defects, which meets all the requirements demanded for ideal tissue transference.

THE TREATMENT OF DYSENTERY BY A RAW APPLE DIET

The use of fruit in the treatment of diarrhœa was advocated some forty years ago, and in 1928 Heisler, a practitioner in Koenigsfeld, published a book on raw apples as a cure for diarrhœa, his attention having been drawn to their value by a patient who had tried what he had heard was an old-fashioned remedy. E. Moro, of Heidelberg, definitely established the raw apple diet as a method of treating dysentery, and used it in all the acute and chronic bowel infections of infancy (*Klinische Wochenschrift*, December 24, 1929, 2414). In Moro's method the diet consists of raw scraped apple only, with no preliminary treatment—no purgation, lavage, or initial water diet. One to four tablespoonfuls of the apple pulp are given every hour or two for 48 hours, with no other food or medicine; if the patient is thirsty, a little water or weak tea is allowed. If the apple alone is refused by the patient, banana pulp is added to the apple and this makes it more palatable. P. A. Earnshaw has recently reviewed the subject of the raw apple diet in dysentery, and gives his personal experiences of it (*Medical Journal of Australia*, September 8, 1934, ii, 305). He comes to the conclusion that it is one of the greatest advances yet made in the treatment of dysentery. He has used it in some fifty cases of dysentery in children in private and hospital practice and cannot remember any patient whose motions were not normal in appearance in from 24 to 48 hours. In the beginning he followed the recommendations of certain Continental writers and forbade water, but some patients began to look very ill without water, and by adding water to the diet and giving a saline purge these patients soon recovered. Now he encourages the use of plenty of water and does not see any reason why it should ever be restricted. Regarding the quantity of apples taken, Earnshaw always advises that a child be given 20 grated apples in a day; it is seldom, however, that the child takes more than 12 and sometimes only six. One cannot depend on children masticating the apple sufficiently, and unless the apple is swallowed in a finely divided state it does harm instead of good. Sometimes, when the patient has tired of the apple, thoroughly ripe bananas were used with equally good results. The apple, however, seemed to lend itself best to grating, as it is firmer in consistency than most fruits; in the grating of the fruit it is the cellulose fibre that must be broken up. Once the motions become normal the author used a transitional diet, the re-introduction of milk to the dietary being always the greatest difficulty. In the older children he found Benger's food useful, beginning with it made with skimmed milk and later with whole milk; in the younger children lactic acid milk was used after the first 24 or 48 hours of apple diet. Recently the author has been using an apple powder with equally good results; it is more easily measured than raw apple, can be left for long periods, can be procured when apples are out of season, and can be given to very young children who would otherwise refuse the raw apple.

THE TREATMENT OF MYOCARDIAL INSUFFICIENCY WITH GLUCOSE AND INSULIN

M. Guillaume (*Journal de médécine de Paris*, October 25, 1934, 920) records his experience in the treatment of cardiac cases with glucose and insulin. Glucose alone has been found of value only when there are few signs of insufficiency. This treatment is of most use in such cases as that of the man aged fifty or over who finds himself out of breath when walking upstairs and who gets palpitation if he hurries to catch a train. In such a patient examination reveals a slight increase in arterial tension, a slightly hypertrophied left ventricle, and perhaps extra-systoles and tachycardia. In more severe cases with dyspnœa and œdema insulin must be given with the glucose. In the presence of an enlarged liver glucose and insulin are useless, and they also have no effect in cases of acute endocarditis. Results in angina pectoris have been encouraging, though not successful in all cases. The most striking success has been obtained with patients who show myocardial failure accompanied by pulsus alternans. Guillaume's method of administration is to give from 50 to 80 grammes of glucose in two doses of 25 to 40 grammes, and after each dose of glucose to inject four units of insulin. This dosage may be continued without any danger of hypoglycæmia, and is otherwise entirely without risk.

X-RAY TREATMENT OF PROSTATIC HYPERTROPHY

For those patients with hypertrophy of the prostate in whom operation is contra-indicated on account of age, bad functioning of the kidneys or chronic cystitis, W. Eccard (*Die Medizinische Welt*, November 3, 1934, 1647) recommends a course of X-ray applications. As a preliminary measure to operation after acute retention of urine has occurred and has been relieved, this method is also applicable. During the treatment the bladder is washed out twice daily with a 1 in 5,000 solution of silver nitrate. Where the state of the patient permits, vasectomy is performed before X-ray treatment is begun. Both the abdominal wall and the perineum are irradiated. Detailed directions as to dosage, filters, and duration of exposure are given in the article. The doses are distributed usually over two days. No bad effects on the bladder or rectum have been observed by the author.

THE TREATMENT OF NOCTURNAL ENURESIS IN CHILDREN

An enormous number of causes of bed-wetting has been suggested: tonsils and adenoids, phimosis, worms, neurosis, orthostatic albuminuria, inguinal hernia, scaphocephaly, irritable bladder and conversely anæsthetic bladder, deep sleep and light sleep, and so on—one author considers bed-wetting as a sign of pulmonary tuberculosis. J. W. J. Earl points out (*British Journal of Children's Diseases*, July-September, 1934, xxxi, 205) that many of these can be dismissed at once, but the one clinical fact which emerges is that when one has weeded out the gross physical abnormalities, the psychopaths and the morons, one is left with a residue—the vast majority of the cases—of a type not easy to define but well recognised by all practitioners, the neuropathic child. In 87 per cent. of one series of cases described training had been obviously inefficient (Anderson), but it does not seem likely that in the perfectly normal child persistent enuresis will result from faulty training alone. What does appear likely is that in a neuropathic type whose training has been defective, the psychological and social maladjustments consequent upon his neurosis will tend to fix the symptoms firmly. The methods of treating enuresis have been been described are innumerable, but all of them have one feature in common, namely, suggestion. Again, there is the question of the prevalence in schools and orphanages, and the occurrence of epidemics. Cameron has seen such epidemics following punishment of enuretics, as has the present author, and there is no neurosis but hysteria which occurs in epidemic form. Earl stresses the value of psychological treatment in enuresis, and states that for the simple case of enuresis uncomplicated by other behaviour disorders, simple suggestion, superficial and symptomatic though it may be, is adequate and efficient. It may be used quite formally, as in hypnosis, or disguised under the name of medical " treatment " or " training."

THE TREATMENT OF LIGHT-SENSITIVE DERMATOSES

The problem of light sensitivity is one in which the final solution will probably be found by the biochemist. It appears to be bound up inseparably with sulphur metabolism, and through sulphur metabolism with the animo-acids and perhaps also the vitamins. The irritative effect of sunlight on lupus erythematosus has long been known; in many of the reported cases lupus erythematosus has followed a severe sunburn and in other cases the disease has been changed from that of a chronic discoid type into one with a widespread dissemination of the lesions. The question of a tuberculous background for this disease is still open for discussion. N. P. Anderson and S. Ayres, Jr. (*Journal of the American Medical Association*, October 27, 1934, ciii, 1279), state that they have found small doses of gold and sodium thiosulphate useful in the treatment of this condition, and that in all cases of lupus erythematosus that they have seen the removal of foci of infection has been stressed. Some cases were greatly improved on a modified Gerson diet, consisting essentially of fruits and vegetables and total exclusion of salt. There are a number of drugs and chemicals which if given internally possess the property of sensitizing the skin to sunlight; among these drugs are arsenic, veronal, eosin, acriflavine hydrochloride, methylene blue, rose bengal and erythrosin. What part faulty liver metabolism plays in the causation of actinic dermatoses and of pellagra is not known, but it certainly appears that liver therapy is of definite value in both conditions.

THE PREVENTION OF RICKETS

For more than a hundred years cod-liver oil has been used for the prevention of rickets. The amount of this oil usually administered as an anti-rachitic is three teaspoonfuls daily. Some six years ago irradiated ergosterol (viosterol) was introduced as a source of vitamin D. As a result of clinical observations the now accepted dosage of the standard 250D viosterol for the prevention of rickets in the average infant is ten drops daily. By exposure to ultra-violet rays vitamin D can also be developed in milk. T. G. H. Drake, F. F. Tisdall and Alan Brown have published (*Canadian Medical Association Journal*, October, 1934, xxxi, 368) from Toronto a study of the anti-rachitic value of cod-liver oil, irradiated ergosterol and irradiated vitamin D milk in a series of 529 infants, varying in age, at the first examination, from three weeks to eight months, over a period of five winter months. At the present time the best means for the diagnosis of rickets, when a large group of cases is being studied, is X-ray examination, and reliance cannot be placed on the usually accepted clinical signs, such as craniotabes, rosary, or moderate enlargement of the epiphyses. The sunshine in Toronto, as at present used, is not entirely efficacious in preventing X-ray evidence of rickets, since 12.8 per cent. of 349 infants examined in October showed very slight rickets, and 4.5 mild rickets. No infants, however, showed moderate or marked rickets. Infants under four months of age in October are more apt to develop rickets in the succeeding five winter months than are infants from four to eight months of age in October. One, two or three teaspoonfuls of cod-liver oil were prescribed for 137 infants. Three infants developed moderate or marked rickets during a period of five winter months. Difficulties encountered in the administration of cod-liver oil under home conditions may have accounted for the development of rickets in these infants. One teaspoonful of cod-liver oil was at least as efficacious as three teaspoonfuls in the prevention of rickets, as evidenced by X-rays. One hundred, 200, 400 and 800 Steenbock vitamin D units, in the form of viosterol (1.5 to 12 drops of 250D viosterol) were prescribed for 186 infants. Under these conditions no infants developed moderate or marked rickets during a period of five winter months. One hundred, 200, 400 and 800 units, in the form of viosterol (from 1.5 to 12 drops of 250D viosterol) were efficacious to the same degree in the prevention of rickets, as evidenced by X-rays. From 20 to 40 ounces of irradiated vitamin D milk, containing 35 Steenbock vitamin D units per 20 ounces, were prescribed to 141 infants. The milk was administered over a period of five winter months. Under these conditions no infants developed moderate or marked rickets. Irradiated vitamin D milk the authors consider a valuable addition to our present anti-rachitic armamentarium.

THE SERUM TREATMENT OF SCARLET FEVER

Knowledge of the practical application of serum therapy in scarlet fever is as important to the general practitioner as knowledge of the correct administration of antitoxin in diphtheria, writes H. Kommsen (*Medizinische Klinik*, September, 1934, 1189). Given as early as possible, and in sufficiently large doses, scarlatinal serum is a life-saving measure. It is of the utmost importance to administer serum while the streptococcal infection is still comparatively localized, before it has overwhelmed the defences of the body. It is generally given intramuscularly, but in bad cases a quarter of the intramuscular dose may be given intravenously. The exact dose varies with the serum selected; some sera are more highly concentrated than others, and these should be given in doses of from 5 to 10 c.cm. ; the dose of less concentrated sera is between 25 and 50 c.cm., according to the severity of the case. In general, little reduction in dosage is made for older children, but in babies and small children the dose is approximately half that for an adult.

REVIEWS OF BOOKS

Features in the Architecture of Physiological Function. By JOSEPH BARCROFT, C.B.E., M.A., F.R.S. Cambridge University Press, 1934. Pp. x and 368. Figs. 106. Price 20*s.*

NOT only the title but its author, the third of the great line of Professors of Physiology at Cambridge, at once arouses the reader's anticipation that this is no ordinary book, and he will find that he he is not only right, but surprised that so much information, and it may be added inspiration, can be so pleasantly presented to him. A remark of Sir John Rose Bradford some six years ago to the effect that the difference between physiology as taught when he was young and now is that formerly the student was given facts, whereas now he receives principles, led the author to tabulate and then to expand his own conceptions of the fundamental principles, and to set them forth in lectures. The list of these principles include the constancy of the internal environment which Claude Bernard set forth at the end of his life to show that the higher forms of life have become independent of their external environment by the evolution of a mechanism whereby an almost absolute constancy of the composition of the fluids bathing the tissues is maintained, or more briefly, " constancy of the internal environment is the condition of free and independent life." This dictum remained unnoticed until well on in this century, but now is recognized as of primary importance ; it is here discussed with an open mind, and at the start described as being " just a little grotesque " in its up-to-date guise. Other principles considered are : that every adaptation is an integration, the all-or-none relation, antagonism, maximal activity, units, duplication, and the chance that a phenomenon has a significance. Stated thus baldly these titles may suggest a somewhat formidable philosophy, but after a glance the text at once arrests attention by its attractively displayed contents. Thus to refer to the last chapter but one, that on " duplication of mechanism " ; the scene opens at scientific meetings thirty years ago when it was " the privilege and to some extent the diversion of the then younger generation to listen to their elders " often insisting that nature had one way only of doing a particular thing. Then follows a discussion of the now recognized alternative mechanisms, such as the nervous and the hormone controls of the body, the protopathic and epicritic sensations, and vision by the rods and by the cones of the retina, the chapter concluding with the frank confession " it is always surprising to me that there is only one heart ! " The final chapter on the chance that a phenomenon has a significance contains a searching criticism on the progress of knowledge in certain directions, especially on the debated question, now perhaps settled at last in the affirmative, of the existence of vasomotor nerves in the lungs, and on carotene. The last few pages on the biological significance of pain are of special interest and lead to the conclusion that the warnings furnished by pain lengthen life more than the actual suffering shortens it.

Chronic Rheumatism: Causation and Treatment. By R. FORTESCUE FOX, M.D., F.R.C.P. and J. VAN BREEMAN, Doctor of Medicine. London: J. and A. Churchill, 1934. Pp. vii and 364. Plates 8 and 38 figures. Price 12s. 6d.

DR. FORTESCUE FOX, who is our leading authority on spas and the President of the International League against Rheumatism, has, with the Honorary Secretary of the League, brought out a remarkably complete and easily read account of the etiology, clinical manifestations, diagnosis and treatment of rheumatic diseases. The International League, of which the authors may be regarded as the spokesmen, was suggested by Dr. van Breeman of Amsterdam in 1913, but owing to the war little progress was made before 1925. Since then the amount of work done has been considerable; thus its nomenclature committee has gone over no less than sixty different classifications of the rheumatic diseases submitted by different nations. With such a varied choice it is interesting to hear that for *statistical purposes* the League has adopted that employed by the British Ministry of Health. The account of the etiology divides the important factors into four categories: local sepsis, constitutional and diathetic influences, abnormal conditions of the skin, and external agents, such as climate, weather, occupation, and injury. The effect of chills is considered in detail and various hypotheses are passed in review. The section on diagnosis and the clinical examination of patients with each of the numerous forms of rheumatic affection is well illustrated, the radiograms being noteworthy for their excellence. In like manner the important subject of treatment by the numerous methods, of which the physical are emphasized, is excellent.

The Rheumatic Diseases: A concise Manual for the Practitioner. By G. D. KERSLEY, M.A., M.D., M.R.C.P. Practitioner Series. London: William Heinemann (Medical Books), Ltd., 1934. Pp. xv and 88. Plates 9. Figs. 2. Price 6s.

IN a preface, Professor Fraser introduces this well written book in a manner much more interesting than is the rule in such blessings, and points out that comparatively recent observations have thrown doubt on the accepted limitations of rheumatic diseases and revived interest in the possibility of a close relation between acute rheumatism and the various forms of chronic arthritis and fibrositis. Dr. Kersley starts with an up-to-date account of rheumatic fever, in which he states that specific treatment by anti-streptococcal serum and vaccine intravenously has not been employed long enough to judge of its results, but is certainly dangerous in unskilled hands. Rheumatoid arthritis is described as a condition of metabolic dysfunction, frequently occuring between the age of twenty and thirty years, and associated with a symmetrical centripetal arthritis, and the causes are grouped under the heads of diathesis, endocrine disturbances, infection and environment. Still's disease is included. Separate accounts are given of fibrositis, osteo-arthritis, climacteric arthritis, spondylitis and gout. In the last chapter the value of physiotherapy is emphasized. This concise but very useful summary should soon pass into a second edition.

Diseases Peculiar to Civilized Man: Clinical Management and Surgical Treatment. By GEORGE CRILE, M.D., edited by AMY ROWLAND. London: Macmillan and Co., 1934. Pp. xi and 427. Illustrations 41. Price 21*s*.

THIS interesting volume is the culmination of nearly a quarter of a century's thoughtful observation, for in October, 1910, Professor George Crile gave the Ether Day address at the Massachusetts General Hospital on "Phylogenetic Association in relation to certain Medical Problems." Man's commanding position in the animal kingdom has been won by the development of his kinetic or energy-transforming system composed of the brain, thyroid, adrenals and sympathetic. In many instances this system becomes over-active, and so "the curse as well as the blessing of civilization", is responsible for these kinetic diseases. These are most frequent in the intellectual and emotional and extremely rare in primitive races and uncommon in the lower ranks of civilized mankind. These diseases are neuro-circulatory asthenia ("irritable heart"), hyperthyroidism, peptic ulcer, and probably diabetes mellitus. They may be treated by lessening the driving power of the brain by rationalization, or if this fails by operations to diminish the driving power of the thyroid (thyroidectomy), the sympathetic (ligature, section, ganglionectomy), or adrenal denervation. Attention is chiefly directed to the last procedure, the technique of severing the "brain" of the sympathetic from its nervous connections being fully described. In 1913 unilateral adrenalectomy was employed, but its benefit was temporary and its operative risks great, and for five years adrenal denervation has been Professor Crile's routine treatment in neuro-circulatory asthenia, in recurrent hyperthyroidism, in some cases of primary hyperthyroidism, in persistent or recurrent peptic ulcer, and in some selected cases of diabetes; it has also done good in some cases of epilepsy. In essential hypertension it has failed to give permanent benefit. In 76 cases of true neuro-circulatory asthenia the operation was followed by cure or improvement in 94 per cent., and the same percentage was obtained in 79 cases of hyperthyroidism. A chapter is devoted to the post-operative complications; among 52 adrenalectomies and 255 adrenal denervations there have been three deaths from acute adrenal deficiency. Bilaterial and unilateral denervations are both performed, the former in two stages. An obvious criticism is that the pituitary gland, which secretes thyrotropic and adrenotropic hormones and so exerts a stimulating action on these glands, is not discussed.

Experimental Bacteriology. Vol. I. By W. KOLLE and H. HETSCH. English version edited by J. EYRE, M.D., D.P.H. London: George Allen and Unwin, 1934. Pp. 592. 118 Plates and 200 Text Figures. Price 30*s*.

THE seventh edition of this well-known German work now appears in English. Anyone concluding from the title that its subject is the experimental study of infection in animals will be deceived; it is a general textbook of bacteriology differing from others of its kind only in arrangement, which still bears traces of its origin in a series of lectures once given by Kolle in Berne, in the absence of chapters on laboratory methods, and in its profusion of illustrations, many in colour, of widely varying merit. This volume deals with the principles of immunology and with most bacteriological infections; a second is to be devoted to tuberculosis and the protozoal, spirochætal, and virus diseases. The method of approach is distinctly clinical, the symptomatology, morbid anatomy and to some extent the general treatment of each disease being described as well as the micro-organism causing it; the work may consequently appeal rather more to the clinician seeking detailed information about the phenomena of infection than to the laboratory worker. Although extensive revision has taken place, and much recent work has been incorporated, this process has failed in some instances; there is, for example, no reference to staphylococcus antitoxin and toxoid, or to the use of carbon dioxide in cultivating *Br. abortus*. To anyone acquainted with recent American work on serological types of Pfeiffer's bacillus the reasoned statement (p. 495) that this organism is incapable of producing meningitis must be more than inexplicable. Many odd words and several ambiguities have been allowed to escape into print; bacterial pigment, for instance, is not "dyestuff" in English, and "the reticulum is unrolled" (p. 343) is puzzling. These minor blemishes may not in themselves detract seriously from the utility of the book, but some of them are highly significant of the consequences to be expected in a textbook from putting new wine into an old bottle.

The Science and Practice of Surgery. By W. H. C. ROMANIS, M.A., M.Ch., F.R.C.S., F.R.S.E., and PHILIP H. MITCHINER, M.D., M.S., F.R.C.S. Two vols. Fifth edition. London: J. & A. Churchill, 1934. Pp. 1751. Figs. 705. Price 14*s*. per volume.

THE present is the fifth edition of this popular textbook to appear since 1927, when it was first published. Success like this speaks for itself and it is evident that there is but little in these two volumes to criticize. In the new edition there have been a few major alterations and a great number of minor ones. From the point of view of the practitioner (if perhaps not that of the student) a little more space might have been devoted to the newer barbiturates in anæsthesia. The unfavourable opinion expressed by Dr. Geoffrey Fildes on radium as a cure for malignant disease still stands unmodified, and only a couple of pages are devoted to treatment by X-rays; the section on radiological diagnosis, on the other hand, is notable for the excellent radiograms reproduced. Böhler is now mentioned in the section on fractures, but his work is rather minimised. These, however, are minor points, and the work as a whole will continue to be prized as a guide by the student and the F.R.C.S. candidate and as a reliable reference book by the general practitioner.

NOTES AND PREPARATIONS

NEW PREPARATIONS

AQUILOX.—This preparation, in the form of sugar-coated tablets, is issued by the Crescent Preparations Co., Ltd., 27, Old Bond Street, London, W. It is made from the tips of selected seaweeds and contains iodine in organic form. The manufacturers state that its stimulating effect on the metabolism of the body has been studied and confirmed by extensive animal experiments. The preparation certainly seems to have a definite tonic value.

DIGILANID.—This is a preparation of the glucosides of digitalis lanata more stable than the infusion of digitalis, easily tolerated in cases with gastric complications, and with a rapid action when given by the mouth. It possesses the pharmaco-dynamic properties of the digitalis family, and its constant composition makes for a constancy of action. It is prepared in the form of tablets, in solution, and in ampoules, and is issued by Sandoz Products, 134 Wigmore Street, W.1.

FAREX.—This is the name given to a new cereal food recently issued by the Glaxo Laboratories, 56 Osnaburgh Street, London, N.W. Farex needs no cooking and can be served straight from the package or in milk, broth, beef tea or similar liquids, making a smooth mixture. The preparation is very palatable and apparently very easily digestible.

HALMAGON.—Halmagon is a new product, issued in the form of tablets and as an emulsion for intramuscular injection, manufactured by Tonicity Laboratories, Ltd., 26 Great Ormond Street, London, W.C.1, and stated to be a carefully devised formula of the halogen compounds of magnesium. The following report on halmagon tablets has been received from our consulting analyst: Average weight per tablet = 0·45 gramme. The accurate determination of traces of bromide, iodide and fluoride in the presence of each other and of an overwhelming quantity of chloride is almost impossible. The figures given below have been obtained by a simultaneous comparative analysis of a laboratory mixture made up in accordance with the printed formula. Average constitution per tablet (exclusive of excipient) :—

Magnesium chloride (anhydrous) - - -	0·22	gramme
Equivalent to crystallized $MgCl_2.6H_2O$ - -	0·463	„
Magnesium bromide - - - - -	0·0132	„
Magnesium iodide - - - - - -	0·000066	„
Magnesium fluoride - - - - -	0·00066	„

The value of this formula as a general tonic and in various specific conditions appears to be confirmed by individual clinical reports and deserves careful trial.

OPOIDINE AND BRISETTES.—Messrs. J. F. Macfarlan & Co., of Edinburgh and London (32 Bethnal Green Road, E.1) are issuing handy little cardboard cases, suitable for carrying in a maternity bag or emergency case, comprising two ampoules of a solution containing opoidine, gr. $\frac{1}{3}$ in combination with scopolamine gr. $\frac{1}{150}$, one ampoule of a solution of scopolamine gr. $\frac{1}{150}$, and four " brisettes " each containing 20 minims of anæsthetic chloroform. One-third of a grain of opoidine is equal to one-sixth of a grain of anhydrous morphine. Practitioners should find these little cases very useful additions to their emergency and maternity outfits.

Oxjus.—This new preparation, issued by the Armour Laboratories, St. Martin's-le-Grand, London, E.C.1, is a combination of concentrated meat juice with vitamin B. Vitamin B first became known as the anti-beri-beri vitamin, the chief source of which is yeast, but more recently its beneficial effect on metabolism and glandular secretion, and as an aid to anti-anæmic substances, has been recognized. The manufacturers state that oxjus contains over 300 international vitamin B units in each ounce. Such a combination should prove to be an improvement on meat juice alone and practitioners should find it particularly useful in cases of exhaustion and malnutrition. The manufacturers state that they will be pleased to send sample and literature to interested practitioners on application.

Rhinitol.—This is the name given to a new preparation of nasal drops, calculated to be useful in colds, nasal catarrh, hay-fever, laryngitis and similar conditions. It contains menthol, eucalyptol and ephedrine, with smaller quantities of chloral-camphor, chlorthymol and azulen, in liquid paraffin (vasogen), and is put up in a handy bottle with a stopper containing the dropper. The manufacturers are Messrs. E. T. Pearson & Co., Ltd., Mitcham, Surrey. Specimens for clinical trial may be obtained by practitioners.

INVESTORS GENERAL FIXED TRUST

This Trust, which was referred to in *The Practitioner* (April 1934, cxxxii, 527), has now announced its second distribution—£166 12*s.* 1*d.* net per unit, or 9.99625 pence on each sub-unit of the Trust—which is stated to be the largest distribution per sub-unit made by a fixed trust of the industrial and general type during a half-year period. The Trust in question offers an investment consisting of ordinary shares, in certain fixed proportions, in a list of 24 first-class industrial companies, many of whose names or products are household words in this country. It is sponsored by the well-known merchant banking firm of Messrs. Dawnay, Day & Co., Ltd. For those who wish to participate in the increasing prosperity of the finest British industrial and commercial concerns with maximum safety, an investment in a fixed trust of this type offers many attractions, including convenience, trustee administration, dividends at regular half-yearly intervals, and a reasonable return on capital invested. Full particulars with booklet can be obtained from the Managers, 15, Moorgate, London, E.C.2.

CADBURY'S CHOCOLATES

Messrs. Cadbury, Bournville, have sent us samples of their cocoa, chocolates and other preparations. Cadbury's cocoa and especially Bourn-vita need no introduction to the medical profession, for the latter holds a high place among food drinks. But the coming of Christmas makes the mention of Cadbury's chocolates topical in these pages, for the various assortments, at all prices, make excellent Christmas gifts.